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TITLE OF THESIS/*TITRE DE LA THÈSE* AGE, SEX, & SITUATIONAL: THE EFFECTS ON THE SOCIAL INTERACTION BETWEEN PAIRS OF CHILDREN OF 4, 6, 8, AND 10 YEARS

UNIVERSITY/*UNIVERSITÉ* U. OF ALBERTA

DEGREE FOR WHICH THESIS WAS PRESENTED/ *GRADE POUR LEQUEL CETTE THÈSE FUT PRÉSENTÉE* M. ED.

YEAR THIS DEGREE CONFERRED/*ANNÉE D'OBTENTION DE CE GRADE* 1977

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AGE, SEX, AND SITUATION: THE EFFECTS ON THE SOCIAL INTERACTION BETWEEN PAIRS OF CHILDREN OF 4, 6, 8, AND 10 YEARS

by

© MARGARET JAMIESON

A THESIS
SUBMITTED TO THE FACULTY OF GRADUATE STUDIES AND RESEARCH
IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE
OF MASTER OF EDUCATION

DEPARTMENT OF EDUCATIONAL PSYCHOLOGY
EDMONTON, ALBERTA
FALL, 1977

THE UNIVERSITY OF ALBERTA

FACULTY OF GRADUATE STUDIES AND RESEARCH

The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies and Research, for acceptance, a thesis entitled "Age, Sex, and Situation: The Effects on the Social Interaction Between Pairs of Children of 4, 6, 8, and 10 Years," submitted by Margaret Jamieson in partial fulfilment of the requirements for the degree of Master of Education.

.....
Supervisor

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Date ..July 22/77..

TO MY MOTHER AND FATHER

ABSTRACT

Research on social interaction in children has reported that the verbal behaviors of a child are influenced by his age (Fisher, 1932), and the setting (Kemp & Kessler, 1970), but not by his sex (Mueller, 1972), while the nonverbal behaviors of a child are influenced by the setting (Guardo, 1969) but not by his age or his sex (Galejs, 1974).

This study was designed to investigate the effects of age, sex, and situation on the verbal and nonverbal behaviors of children of 4, 6, 8, and 10 years. Thirty-two same-age and same-sex dyads were introduced to a free play situation and to a structured activity. Videotapes of all sessions were analyzed using the Bales' Interaction Process Analysis.

Analysis of the data indicated that the frequency of verbal behavior in the conversations between children was influenced by age and by an interaction between age and situation. The frequency of nonverbal behaviors in the social interaction between children was influenced by triple interaction of age, sex, and situation as well as an interaction between age and situation, an interaction between age and sex, and both an age effect and a situation effect. Since the simple main effects were expected and supported by the results, the hypotheses were partially supported.

Possible explanations for the significant findings were presented and discussed, results were compared with the results of related research, and implications for future research were suggested.

ACKNOWLEDGEMENTS

I would like to acknowledge and thank Dr. Len Stewin for his support, guidance, and constructive criticism throughout the course of this study. Dr. Lily Oddie's assistance and advice is very much appreciated. I would also like to thank Dr. L. Stewin, Dr. L. Oddie and Dr. C. Yewchuk for acting on my committee.

Gratefully acknowledged is the cooperation of the children and parents who volunteered to participate in the study and the assistance of Darlene Bayers, Margaret Brackstone, Brian Fuller, and Jamie Jamieson. A special thank you to Noreen Paananen for her time, ideas, and advice.

Finally, I would like to express my thanks to my parents and family for their encouragement and help.

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CHAPTER I

INTRODUCTION

Alvy (1973), Flavell, Botkin, Fry, Wright, and Jarvis (1968), and Sarbin and Allen (1968) have suggested that when a speaker is about to address a listener he usually makes some assumptions about certain of the listener's characteristics. These assumptions are usually reflected in the speaker's message. Consider a situation in which the son wishes to borrow his father's car. Prior to the conversation, the son may notice that his father is reclined in his 'easy' chair and is smiling. Since his father appears to be in 'good' spirits, the son may assume that his father likely will lend him the car and will ask him directly for the car. If the father is reading the paper or shouting at his son about being out late the night before, the son may assume that the father will be difficult to persuade. This may lead the son to use a different approach to communicate his message. Or consider a situation in which a teacher wishes to inform his pupils about Canada's role in World War II. If the teacher assumes that the students are naive about Canadian history, he may preface his comments with background information about Canadian history in general. However, if the teacher assumes that the students have considerable

knowledge about Canadian history, he might assume background information would be superfluous. Regardless of the situation, the defining qualities of the spoken communication appears to be that a speaker is intending to communicate a message to another person, that the speaker makes some assumptions about the listener's characteristics which will aid in fulfilling the speaker's intentions, and that these assumptions are utilized by the speaker and reflected in what the speaker says.

The theory and research of Piaget (1974) reflected this view. However, he asserted that the ability of a child to assess a listener's characteristics and to utilize this information in his communication is the result of cognitive development and social experience. Between age 2 and 7 or 8 years, the child is incognizant of the notion of "points of view" (Flavell et al., 1968) and is unaware of how his own view may differ from others' views. As a result

> when the child utters phrases, he does not bother to know to whom he is speaking nor whether he is being listened to. He talks either for himself or for the pleasure of associating anyone who happens to be there with the activity of the moment . . . . the child speaks only about himself. (Piaget, 1974, p. 32)

After age 7 or 8 years the child considers the notion of

"points of view" and uses the information to adapt his speech.

Others who have investigated adapted and unadapted speech in children agreed that the proportion of unadaptive speech decreases with an increase in age while adaptive speech increases (Cohen & Klein, 1968; Day, 1932; Fishbein, Lewis, & Keiffer, 1972; Fisher, 1932; Flavell et al., 1968; Longhurst & Turniere, 1971; McCarthy, 1930; Rubin, 1973; Tierney & Rubin, 1975). In addition, they suggested that situational factors may influence these speech behaviors (Kamp & Kessler, 1970; Williams & Mattson, 1942) while the sex of the subject does not (Cohen & Klein, 1968; Fisher, 1934; Mueller, 1972; Tierney & Rubin, 1975).

Piaget's theory and research made no mention of the role that nonverbal behaviors play in communication. Since investigators have suggested that the emotional state of an individual can be expressed through his facial expressions, body movements, and gestures, the ability to accurately "send" and "receive" such messages would seem to be important for effective communications. Research on the significance of nonverbal behaviors to human interaction has centered around adults. The few investigations using children as subjects suggested that age had little effect on nonverbal

behaviors (Galejs, 1974), as did the sex of same sex dyads (Galejs, 1974); however, situational factors did appear to influence these behaviors (Bass & Weinstein, 1971; Guardo, 1969).

Thus in summary, it appears that the verbal behaviors of children were influenced by the age of the child and by the situation but not the sex of the child. Nonverbal behaviors were affected by the situation but not the age or sex of same-sex pairs.

To investigate social behavior in children, the categorization of observed behaviors according to an a priori system has gained favor among researchers (Gellert, 1955; Thompson, 1960). A number of systems have been developed and have been reviewed in the literature (Simon & Boyer, 1971a, 1971b; Weick, 1968); however, many were confined to specific problems and did not have general relevance. One system that has received general acclaim as an observation technique that can be applied to a variety of social situations is the Bales' Interaction Process Analysis. Although this system has not been used extensively to investigate the social interaction of children it has been used to investigate adult problem solving groups. It considers both the verbal and nonverbal aspects of communication. Its categories can

be compared readily with the categories used by Piaget (1974) to investigate adaptive speech. In light of this it appeared as if the Bales' system could be used to assess the effect of age, sex, and situations on the verbal and nonverbal behaviors of pairs of children.

The Purpose of the Study

The purpose of this study was to investigate the social interaction between pairs of children. Males and females of 4, 6, 8, and 10 years were paired with a friend of the same age and sex. The pair were then videotaped while interacting in a "free play" situation and a "structured activity" situation. The taped sessions were later analyzed using the Bales' Interaction Process Analysis. It was the intention of the investigator to determine if the age, sex of the dyad, or situation, or a combination of these three variables influenced the verbal and nonverbal behaviors of the children between 4 and 10 years.

Outline of the Study

In Chapter I the major theories and research results have been presented and the three variables of the investigation have been introduced. Chapter II expands on the theory and research results presented in Chapter I and

presents literature on variables that are to be controlled in this investigation. The definitions and hypotheses are presented in Chapter III. In Chapter IV the procedures are described. Chapter V contains an analysis of the data and Chapter VI is a discussion of the results, conclusions drawn, and implications for future research.

CHAPTER II

REVIEW OF RELATED LITERATURE

This chapter is intended as a review of the relevant literature on social interation in children. Those theories and research results that strengthened the rationale for the present study are discussed under the major headings of,

1. social interaction between children of 4 years to 10 years--verbal communication, nonverbal communication, socio-economic status, and the single parent family.
2. Social interaction observation techniques--Bales' Interaction Process Analysis, Bales' Interaction Process Analysis and related literature, a discussion on the use of Bales' Interaction Process Analysis to investigate the social interaction between children.
3. Summary--social interaction between children of 4 years to 10 years, social interaction observation techniques.

Social Interaction Between Children of 4 Years to 10 Years

Social interaction is said to occur

> when an action by one person is in some way responded to by another person, when each person is aware of the other and of the action in question, and when the action responded to is directed to or is about the person who is responding. (Dyck, 1963, p. 80)

The actions take the forms of verbal and nonverbal behaviors

(Barnlund, 1968; Clausen, 1968; Grimshaw, 1973; Inkeles, 1968). These behaviors are discussed below.

Verbal Behaviors

Speech and language is used by man to communicate ideas and to influence others. Piaget (1974) asserted that a child is not born with this ability. It is only with cognitive development and social experience that the child learns to use his language to influence others.

Piaget (1974) claimed that between age 2 and 7 or 8 years, the fundamental and pervasive quality of a child's thought is its egocentrism. The child is incognizant of the notion of points of view and thus is not aware of how his own view may differ from other people's view (Flavell, Botkin, Fry, Wright, & Jarvis, 1968). Insensitive to the fact that the way he has organized the environmental data is only one construction among many possible constructions, the child fails to check for cognitive bias in his point of view and to inquire about differences between his view and others' views (Feffer, 1967; Flavell et al., 1968; Looft, 1972).

This egocentrism of thought is reflected in the child's speech.

> When a child utters phrases . . . , he does not bother to know to whom he is speaking nor whether he is being listened to. He

> talks either for himself or for the pleasure of associating anyone who happens to be there with the activity of the moment. . . . the child speaks only about himself, . . . he does not attempt to place himself at the point of view of his hearer. Anyone who happens to be there will serve as an audience. The child asks for no more than an apparent interest, though he has the illusion (except perhaps in pure soliloquy if even then) of being heard and understood. He feels no desire to influence his hearer nor to tell him anything. (Piaget, 1974, p. 32)

Piaget (1974) referred to this behavior as egocentric speech.

After age 7 or 8 years the child gradually rids himself of the egocentrism of speech. Due to his contact with other children, he is forced to re-examine his own perceptions and concepts (Flavell, 1963; Flavell et al., 1968). He now considers the notion of points of view and uses the information to adapt his speech. Piaget (1974) asserted that once the child is able to utilize his speech to communicate his thoughts effectively to others, he has achieved socialized speech. The two forms of speech behavior are discussed below.

Egocentric Speech

Piaget (1974) implied that egocentric speech is a non-social form of verbal communication (Alvy, 1973). It is a form of speech which, whether uttered in solitude or in the

presence of others, is judged to lack a communication aim. The speaker does not attempt to take the role of the listener nor to make certain that the listener is attending (Flavell, 1963; Flavell et al., 1968). Piaget divided egocentric speech into three subcategories: (a) echolalia (repeats words or syllables for the pleasure of talking), (b) monologue (talks to himself as though he were thinking aloud), and (c) dual or collective monologue (conversations between children where an outsider is always associated with the action or thought of the moment and is expected neither to attend nor to understand).

Egocentric speech in the conversations of children from 4 years to 10 years has been investigated with regards to proportion, age, sex, and situation. The results are reported below.

Proportion. Piaget (1974) recorded and classified the spoken behaviors of children of 4 through to 7 years as they engaged in various activities while in a school setting. He reported that approximately 44% to 47% of the spoken behavior of a child between 4 and 7 years could be classified as egocentric speech. This percentage dropped to 25 somewhere between 7 and 8 years. Other investigators have tended to support the reported proportion of egocentric speech in the

conversations of young children (Day, 1932; Fisher, 1934; Garvey & Hogan, 1973; Rugg, Krueger & Sondergaard, 1929).

Age. Piaget (1974) found that the percentage of egocentric speech in the conversations of children decreased with an increase in age. This has been generally corroborated by other investigators (Day, 1932; Fisher, 1934).

Sex. The proportion of egocentric speech at a given age and the developmental pattern have been found to be the same for males and females (Fisher, 1934; Mueller, 1972).

Situation. Although most investigations have supported Piaget's (1974) finding that there was a high proportion of egocentric speech in the conversations of children between 4 and 7 years, the proportions have varied over a wide range. Silverman (1973) reported a percentage of 0.8 for 4 year olds in an interview situation and of 23.2 for the same group in a school setting. This has led researchers to question (McCarthy, 1930) and to investigate (Kamp & Kessler, 1970; Williams & Mattson, 1942) the effects of the environment on the proportion of egocentric speech. The results implied that the size of the group under investigation and the age of the listener (peer versus adult) may influence the proportion.

Socialized Speech

Piaget (1974) implied that socialized speech is a social form of communication (Alvy, 1973; Flavell, 1963). It applies to utterances which are judged to possess a genuine communication aim. For example, the child addresses his listener, adopts the point of view of his listener, and tries to exchange ideas or to influence the listener's actions. Piaget (1974) divided socialized speech into five categories: (a) adaptive information (the child adopts the point of view of his listener, (b) criticism, (c) commands, requests, and threats, (d) questions, and (e) answers. The results of investigations with regards to age, sex, and the development of role-taking ability are discussed below.

Age. From his records of the spoken behaviors of children, Piaget (1974) concluded that age was a variable that influenced the development of socialized speech. The proportion of socialized speech in a child's conversation increased with an increase in the child's age. Investigators have generally corroborated this finding (Cohen & Klein, 1968; Day, 1932; Flavell et al., 1968; Fishbein, Lewis, & Keiffer, 1972; Fisher, 1934; Longhurst & Turniere, 1971; McCarthy, 1930; Rubin, 1973; Tierney & Rubin, 1975).

McCarthy's investigation (1930) was of additional

interest. She extended her study to determine the effect of age on the verbal behaviors that had been subclassified into the five categories of Piaget's socialized speech. The results indicated that adapted information, questions, and answers increased with age. Criticism appeared to be related more to the personality of the child than his age. Wishes, requests, commands, threats, and other emotionally toned responses showed decreases with age.

Sex. Like egocentric speech, socialized speech did not appear to be influenced by the sex of the speaker nor by the sex of the speaker-listener pair (Cohen & Klein, 1968; Fisher, 1934; Mueller, 1972; Tierney & Rubin, 1975).

The Development of Role-Taking Ability. Role-taking refers to a cognitive process of adopting the perspective, attitude, or point of view of another person--not to play out the other person's role but to understand his role. Piaget (1974) implied that a child must be able to role-take before he can learn to effectively communicate to others.

Recently, investigators have concerned themselves with the development of role-taking and communication effectiveness (Cohen & Klein, 1968; Cowan, 1966; Devries, 1970; Flavell et al., 1968; Glucksberg, Krauss, & Weisberg, 1966; Krauss & Glucksberg, 1969; Longhurst & Turnure, 1971;

Maratsos, 1973; Marvin, Greenberg, & Mossler, 1976; Menig-Peterson, 1975; Miller, Kessel, & Flavell, 1970; Mossler, Marvin, & Greenberg, 1976; Peterson, Danner, & Flavell, 1972; Piche, Michlin, Rubin, & Johnson, 1975; Salatas & Flavell, 1976; Selman, 1971). The research results implied:

1. that role-taking ability improved with age (Cohen & Klein, 1968; Devries, 1970; Flavell et al., 1968; Marvin, Greenberg, & Mossler, 1976; Menig-Peterson, 1975; Miller et al., 1976; Salatas & Flavell, 1976).

2. that the period of gradual improvement extended from approximately 4 years of age through to early adolescence (Flavell et al., 1968; Marvin et al., 1976).

3. that the ability to role-take appeared to be one of several abilities needed by a child in order to communicate effectively with others (Flavell et al., 1968).

4. that communication effectiveness improved gradually over the age span from 6 years to 11 (Krauss & Glucksberg, 1969).

5. that communication effectiveness varied according to the task requirements (Krauss & Glucksberg, 1969).

6. that communication effectiveness appeared to be influenced by the speaker's ability to decode the listener's request for help (Peterson et al., 1972).

In light of this, it would appear that the older the child, the more effective he would be in meeting the verbal requests of his partner and the more closely his verbal behavior would complement the verbal behavior of his partner.

Nonverbal Behaviors

Piaget's theory and research made no mention of the role that nonverbal behaviors play in communication. Since investigators have suggested that the emotional state of an individual could be expressed through his facial expressions, body movements, and gestures, the ability to accurately "send" and "receive" such messages would seem to be highly important for effective communications.

It was not until the 1950s that studies commenced reporting on the significance of nonverbal behavior to human communication (Duncan, 1969). Since then most of the research has centered on the nonverbal interaction between adults (Duncan, 1969; Ellsworth & Ludurg, 1972; Harrison, 1973; Hore & Paget, 1975). The results of the limited investigations using children as subjects are reported below under the headings of age, sex, and situation.

Age. Investigators have reported that age influences the frequency of eye contact during conversations (Ashear & Snortum, 1971; Levine & Sutton-Smith, 1972), the ability

to form the facial expression of a model (Hamilton, 1973; Odom & Lemond, 1972), and the accuracy of judging when someone is looking at you during social interaction (Lord, 1974). The interaction of the variables age and sex appeared to affect the physical distance between liked and disliked peers as well as the ability to use the social cues of eye contact and physical proximity in identifying affiliative relationships (Aiello & Aiello, 1974; Bass & Weinstein, 1971; Guardo, 1969; Meisels & Guardo, 1969; Pederson, 1973; Post & Hetherington, 1974).

The reported results implied that age or age interacting with the variable sex influenced certain nonverbal behaviors. However, Galejs (1974) reported on a study in which the nonverbal behaviors of pairs of males and females of 3 to 5 years were classified into one of 44 categories. From the results, she demonstrated that age has little effect on nonverbal behavior. Only seven of the 44 categories related significantly to age.

Sex. Ashear and Snortum (1971) and Levine and Sutton-Smith (1973) reported sex differences in the frequency of eye contact during conversations between children. Aiello & Aiello (1974), Guardo (1969), Meisels and Guardo, (1969), Pederson (1973), and Post and Hetherington (1974) found an

age-sex interaction effect on physical distance between liked and disliked peers and on the ability to use the social cues of eye contact and physical proximity in identifying affiliative relationships. However, Galejs (1974) found that the sex of the subjects did not influence the nonverbal behavior of her sample. She reported, however, that sex-by-partner's sex yielded significant results. Opposite sex pairs displayed more leading, dominating, and demonstrating behavior when compared to same-sex pair. Same-sex pairs were more giggly, happy, attention seeking as well as grabby, unfriendly, and unconstructive.

Situation The setting and the degree of acquaintance appeared to influence the physical distance between the interacting children (Bass & Weinstein, 1971; Guardo, 1969).

Socioeconomic Status and the Single Parent Family

The literature on the socioeconomic status and on the single parent family has suggested that these two variables could influence the social interaction between children.

Socioeconomic Status and Verbal Behaviors. The British sociolinguist, Basil Bernstein (1961, 1970) postulated the presence of two "linguistic modes" used for communication and for the organization of experiences. The lower-class, he suggested, uses a "public" language mode characterized by

a rigid and restricted grammatical usage. The middle-class, however, used a "formal mode". This mode was considered to be more flexible, to have greater structural possibilities, and to allow for more varied communication. Although the studies on the verbal communication skills of different social classes did not allow one to conclude that there were two linguistic modes of communication, they did imply that the lower class had relatively poorer communication skills than the middle class (Alvy, 1973; Higgins, 1976). Syntactic errors decreased at a slower rate in lower class children between 3 years and 6 years than in their middle class peers (Parisi, 1971). Lower class children of 5 years used shorter communication units, showed less subordination, and generated more content-bound word meanings than did their middle class counterparts (Jones & McMillan, 1973). In investigations on socialized speech, lower class grade-school children appeared to emit more egocentric speech behaviors than their middle class peers.

Socioeconomic Status and Nonverbal Behaviors. Bernstein (1970) hypothesized that lower class children tend to emphasize the nonverbal channels of communication to compensate for the limitations in their verbal system. Although the limited research did not indicate this, it did suggest

social class differences. Brooks, Brandt, and Wiener (1969) observed the responses of middle class and lower class children to congruent and to incongruent word-tone pairings. Lower class subjects responded to the positive or negative expression of a word only when the word was paired with a congruent vocal inflection while middle class subjects responded to the word alone and to the word with congruent inflection. Further, middle class children responded only minimally to incongruent word-tone pairings while lower class peers responded to the word and not the tone. Investigations on the effects of socioeconomic status on the spacing between interacting dyads (Tolor & Orange, 1969) reported that lower class children were more varied in their distance responses than their middle class counterparts.

The Single Parent Family. The literature on the single parent family has suggested that father absence and mother absence has deleterious effects on a child's social development (Biller, 1970; Bowlby, 1969, 1973; Ferri, 1973; Heinicke & Westheimer, 1965; Lamb, 1975; Nash, 1965; Robertson & Robertson, 1971; Yarrow, 1967).

In father absent studies, investigators have reported abnormalities in a variety of areas--including sex-role adoption, particularly among boys (Biller, 1970; Biller &

Bahm, 1971; Lamb, 1975; Santrock, 1970; Sears, Pontler, & Sears, 1946), academic performance and achievement (Santrock, 1970, 1972), and interpersonal relationships (Biller, 1970; Hetherington, 1972). Since many of the studies have been criticized for methodological weaknesses (Lamb, 1975), few definite conclusions can be drawn from the literature. Nevertheless, it can not be denied that father absent children are at a disadvantage (Lamb, 1975).

Investigators have associated mother absence with language and sensori-motor retardation, deficits in concept formation, affective blandness, and psychopathic personalities (Bowlby, 1969, 1973; Feigenbaum, 1974; Robertson & Robertson, 1971; Yarrow, 1967). Like studies on father absence, this research has been attacked on the poor use of experimental designs, on the use of invalid and unreliable instruments of measurement, and on the lack of adequate control groups (Pinneau, 1950). The moral issues that center on the use of human children in studies on deprivation prevent an adequate investigation of the effects of mother's absence on her offspring's development. However, researchers have attempted to overcome these difficulties by using animal subjects. Although generalizations to humans must be made with caution, these animal studies strongly intimate that mother imparts

to her children security and trust which are essential to all subsequent social development (Harlow, 1974). Animal infants raised under conditions of maternal deprivation display abnormalities in both social and sexual development. Thus, it is the opinion of the author that inadequate control of socioeconomic status and single parent families could bias the results on social interaction in children.

Social Interaction Observation Techniques

To investigate the social behaviors of groups of children, the categorization of observed behaviors according to an a priori system has gained favor among researchers (Gellert, 1955; Thompson, 1960). The frequency of behaviors assigned to each category provides the metrics for individual and group comparisons. A number of interaction observational systems have been developed and have been reviewed in the literature (Simon & Boyer, 1971a, 1971b; Weick, 1968). Many of these systems are confined to specific problems and do not have general relevance. One system that has received general acclaim as an observation technique that can be applied to a variety of social interactions is Bales' Interaction Process Analysis (Weick, 1968). It will be discussed below, followed by a review of related literature, and by a discussion on its use as an observational technique

in analyzing social interaction between children.

Bales' Interaction Process Analysis

The term Interaction Process Analysis (IPA) has been adopted by Bales (1950) to designate a method that enables an observer to record the social interaction in a small group. With the IPA an observer can collect data on a wide variety of small face-to-face groups and in turn develop a theory relevant to the analysis of small groups (Anderson, 1972; Bales, 1950; Bales & Gerbrand, 1948).

According to Bales (1950),

> a small group is defined as any number of persons engaged in interaction with each other in a single face-to-face meeting or a series of meetings, in which each member receives some impression or perception of each other member distinct enough so that he can, either at the time or in later questioning, give some reaction to each of the others as an individual person, even though it be only to recall the other was present. (p. 33)

Therapy groups, children's play groups, adolescent gangs, social clubs, and management groups could, under this definition, constitute a small group. In order for one method to be applied to such a diversity of conditions, Bales emphasized that the system must be concerned with aspects of interaction that generally appear in communication between members of small groups. Such generalities include: small

groups involve plurality of persons; members of a group have a common task problem that arises out of their relation to an outer situation; and certain social and emotional problems arise from contact with other members. Since such problems are common to all members, Bales has assumed that each act from each member can be analyzed according to its bearing on the problems. It is this kind of analysis that Bales called interaction process analysis.

In order to effectively analyze group interaction, Bales (1970) has constructed a set of 12 categories. The 12 categories are as follows:

1. Seems friendly
2. Dramatizes
3. Agrees
4. Gives suggestion
5. Gives opinion
6. Gives information
7. Asks for information
8. Asks for opinion
9. Asks for suggestion
10. Disagrees
11. Shows tension
12. Seems unfriendly. (Bales, 1970, p. 92)

The set of categories was meant to be all inclusive so that every act observed could be recorded under a defined category. In addition, the method was made continuous in that the observer was required to classify each act he observed as it occurred in a sequence; however, what a person said or did was not recorded as to content but as to its effect on the interaction process.

When scoring, the act or "unit to be scored is the smallest discriminable segment of verbal or non-verbal behavior to which the observer, using the present set of categories after appropriate training, can assign a classification under conditions of continuous serial scoring" (Bales, 1950, p. 37). Nonverbal as well as verbal behaviors are scored, each group member is scored separately, and all members in a group should be scored.

Bales' Interaction Process Analysis and Related Literature

Much of the research that has accumulated on the Interaction Process Analysis has centered around the observation of social behaviors in adult groups (Bales, Strodtbeck, Mills, & Roseborough, 1951; Beckhouse, Weiler, Tanur, & Weinstein, 1975; Burke, 1974; Butler & Cureton, 1973; Butler & Jaffee, 1974; Emiley, 1975; Heinicke & Bales, 1953; Katzell, Miller, Rotter, & Venet, 1970; Levine, 1973; Lewin, Dubno, & Akula,

1971; Liberman, 1971a, 1971b; Pino & Cohen, 1971; Psathas, 1960; Reynolds, 1971; Richard & Jaffee, 1972; Sermat, 1970; Slater, 1955; Wexley & Hunt, 1974). The results of these studies have suggested that newly formed adult groups tend in the course of time to develop relatively stable patterns of interaction. Certain investigators have gone as far as attempting to fit the interaction profiles to mathematical distributions (Bales, Strodtbeck, Mills, & Roseborough, 1951; Burke, 1974).

Although Bales (1950) made reference to children's play groups as constituting small groups and thus presumably open to investigation using his observation technique, little research has been apparent. Bales and Hare (1965) referred to the work of Gruber on children's play with dolls:

> The behavior of 13 preschool children judged to be high on Task orientation and 13 judged to be low on Task orientation is recorded as they play with a doll house and dolls in the presence of a psychologist. When each child is taken into the playroom he sees a doll house without dolls. He is then given dolls as he asks for them. As the child plays with the dolls for 40 minutes the psychologist takes longhand notes of the child's behavior and interaction. The protocols are scored later, using the Bales' categories. (p. 255)

In Gruber's study, investigators were primarily interested

in how much task behavior a child would initiate if left to his own devices. They were not investigating the social interaction between the experimenter and the child and so social interaction was kept to a minimum. In another study by Hare (1957), third-grade boys who had been identified by their teachers as leaders were observed at play with their friends on the school playground and in their respective neighborhoods after school. Their interactions were scored using the Bales' categories. The results implied that there were interaction differences between a leader and a friend when in the school playground as opposed to the neighborhood after school. More recently, Bales' Interaction Process Analysis has been used by Caudill and Schooler (1973) and Halverson and Waldrop (1970) to investigate mother-child interaction and by Bryan (1974) and Bryan and Wheeler (1972) to study the classroom behaviors of learning disabled children. The results have allowed for discussions on the difference between the classroom behaviors of the learning disabled child and the normal child, and on the difference between mothers interacting with their own child as opposed to their interacting with a strange child.

The Use of Bales' Interaction Process Analysis to Investigate the Social Interaction Between Children

The research suggested that the Bales' observation system is sensitive enough to reflect developmental trends in adult interaction and to report differences between investigated adult-child groups and child-child groups. Does this encourage its use in studying the developmental trends in the social interaction between pairs of children of 4 to 10 years? It is the opinion of the writer that it does. In addition to the argument on research sensitivity, Bales' Interaction Process Analysis was developed to analyze the interaction of small groups. According to Bales (1950), children's play groups constitute a small group. Both the nonverbal as well as the verbal behaviors emitted during social interaction can be scored using Bales' categories. Bales' categories can readily be compared with the five subcategories of Piaget's socialized speech. Piaget's category "answers" could be compared to Bales' categories "gives suggestion, gives opinion, and gives information." Piaget's category "questions" could be represented by Bales' categories "asks for suggestions, asks for opinions, and asks for information." As for Piaget's categories "criticism" and "commands, requests, and threats," the affective or emotional tone of

the remark could be used to determine the Bales' counterpart. Commands or criticisms made with minimal emotional tone could be categorized as Balés" "gives suggestion" or "gives opinion." Commands, criticism, or threats accompanied with negative overtones could be scored in Bales' categories "disagrees," "shows tension," and "seems negative." Piaget's category "adapted information" has no direct counterpart in Bales' system; however, with slight modifications in the Bales' system this category could be represented. Remarks that were adaptive could be scored in the appropriate category of Bales' Interaction Process Analysis and be separated from unadaptive remarks by the use of a unique symbol (for example, 1 as opposed to L).

Summary

The social speech of children between 4 and 10 years appeared to be influenced by the age of the interacting pair but not by the sex of the dyad or the situation. Between 4 and 7 to 8 years the child was incognizant of the notion of point of view and was not aware of how his own view of events may have differed from other people's views. This egocentrism of thought was reflected in his speech. After age 7 or 8, the child gradually rid himself of his egocentrism of thought and thus his egocentrism of speech. The child

then considered the notion of points of view and used this information to communicate with others. The change in the child's thought processes was made apparent when investigating the proportion of egocentric speech in the child's conversation. During the age period from 4 to 7 or 8 years, approximately 40% or more of the child's speech could be classified as egocentric speech. After age 7 or 8 years this percentage dropped to 25% or less.

Unlike verbal behavior, the child's nonverbal behaviors seemed to be influenced by the situation but not by the sex or age of the dyad. Although some investigators have reported age and sex differences on isolated nonverbal behaviors, Galejs' detailed investigation (1974) failed to identify age differences and sex differences between same-sex dyads.

Research on the effects of socioeconomic status on the child's development indicated that children of lower class families differed from their middle class peers in certain verbal and nonverbal behaviors. Research on the single parent child implied that the father-absent or mother-absent child was at a disadvantage when compared to his father-present or mother-present counterpart. Single parent children may show abnormalities in interpersonal relationships and in sex-role development. In total, the results

suggested that in experiments on social interaction between children, the variables of socioeconomic status and single parent families should be controlled.

To investigate the social interaction between children, the categorization of the observed behaviors according to an a priori system has gained favor among researchers. One such system that has received general acclaim as an observation technique that can be applied to a variety of social interactions is Bales' Interaction Process Analysis. Although this system has not been used extensively to investigate children's groups, it appeared that the technique could readily be adapted for this use. The Bales' analysis considered both the verbal and nonverbal aspects of communication and its categories could readily be compared with the categories of socialized speech outlined by Piaget (1974). In light of this, it appeared that the Bales system could be used to assess the effects of age, sex, and situation on the verbal and nonverbal behaviors of children.

CHAPTER III

DEFINITIONS AND HYPOTHESES

Definitions

The following definitions were employed in this study.

Egocentric Speech. Egocentric speech is a form of speech which, whether uttered in solitude or in the presence of others is judged to lack a communication aim. The speaker does not attempt to take the role of the listener nor to make certain that the listener is attending (Flavell, 1974; Flavell et al., 1968; Piaget, 1974). Egocentric speech can be divided into three subcategories: (a) echolalia (repeats words or syllables for the pleasure of talking), (b) monologue (talks to himself as though he were thinking aloud), and (c) dual or collective monologue (conversations between children where an outsider is always associated with the action or thought of the moment and is expected neither to attend nor to understand).

Socialized Speech. Socialized speech is a form of speech which is judged to possess a genuine communication aim. For example, the child addresses his listener, adopts the point of view of his listener, and tries to exchange ideas or to influence the listener's action (Flavell, 1963; Flavell et al., 1968; Piaget, 1974). Socialized speech

can be divided into five subcategories: (a) adaptive information (the child adopts the point of view of his listener, (b) criticism, (c) commands, requests, and threats, (d) questions, and (e) answers.

Verbal Behaviors. The term verbal behaviors refers to spoken language behaviors such as spoken words, phrases, and sentences as well as fluencies in speech, vocal tones, and other voice qualities.

Nonverbal Behaviors. The term nonverbal behaviors includes bodily actions such as facial expressions, eye movements, gestures, body posture, and tactile contact as well as yawns, laughter, and sound effects while at play.

Verbal Scores. This term is used to refer to the classification of verbal behaviors according to the Bales' Interaction Process Analysis.

Nonverbal Scores. This term is used to refer to the classification of nonverbal behaviors according to the Bales' Interaction Process Analysis.

Frequency. The term frequency refers to the total number of behaviors assigned to a given category of the Bales' system or to all categories.

Proportion. The term proportion refers to the number resulting from the division of the frequency for a given

category of the Bales' system by the frequency for all categories of the Bales' system.

Profile. The term profile refers to an array of the frequencies in each of the Bales' categories.

Dyad. The term dyad refers to a pair of children of the same age and the same sex.

Relationship. The term relationship refers to the correlation between the profiles of a dyad.

Free Play Situation. The term free play situation refers to a play session in which a pair of children are introduced to a room containing a variety of toys and games and are instructed to play as they like.

Structured Activity Situation. The term structured activity situation refers to a play session in which a pair of children are introduced to a room containing a box of blocks and a model built from similar blocks and are instructed to build one structure just like the model from the blocks in the box.

Hypotheses

The following hypotheses were investigated in this study. The research on egocentric and socialized speech has suggested that the proportion of egocentric speech decreases with an increase in the age of the child while the

proportion of socialized speech increases (Cohen & Klein, 1968; Day, 1932; Flavell et al., 1968; Fishbein, Lewis, & Keiffer, 1972; Fisher, 1934; Longhurst & Turniere, 1971; Rubin, 1973; Tierney & Rubin, 1975). The proportions tend to be unaffected by the sex of the subject (Cohen & Klein, 1968; Fisher, 1934; Mueller, 1972; Piaget, 1974; Tierney & Rubin, 1975), however Silverman (1973), Kamp and Kessler (1970), and Williams and Mathson (1942) reported that the proportion of egocentric speech in a child's conversation can be affected by environmental factors. In light of the research, the following hypothesis was proposed.

Hypothesis 1. There will be a significant difference between age groups and situations but not between sex groups on the verbal scores.

From observations on the spoken behaviors of children Piaget (1974) implied that approximately 44 to 47% of the spoken behavior of children between 4 and 7 years can be classified as egocentric speech. This percentage drops to 25% somewhere between 7 and 8 years. Later investigators have tended to support the high degree of egocentric speech in the conversations of young children (Day, 1932; Fisher, 1934; Garvey & Hogan, 1973; Rugg, Krueger, & Sondergaard, 1929). This research provided support for the following

hypotheses.

Hypothesis 2. Forty percent or more of the verbal scores for each child between 4 and 7 years will be scored as egocentric speech.

Hypothesis 3. Twenty-five percent or less of the verbal scores for each child of 8 years or more will be scored as egocentric speech.

McCarthy (1930) investigated the effect of age on children's verbal behaviors that had been classified according to the five categories of Piaget's socialized speech. Her results indicated that adaptive information, questions, and answers increased with age. Criticism appeared to be related more to the personality of the child than his age. Wishes, requests, commands, threats, and other emotional toned remarks showed a decrease with age. This research suggested the following hypothesis.

Hypothesis 4. For a given category on the Bales' Interaction Process Analysis, the verbal proportions for the group of children whose proportion of egocentric speech is 0.40 or greater will differ significantly from the verbal proportion for the group whose proportion of egocentric speech is 0.25 or less (see Table 1).

Jean Piaget (1974) asserted that the factor which

TABLE 1

THE PROPOSED DIFFERENCE BETWEEN THE VERBAL PROPORTIONS FOR CHILDREN WHOSE PROPORTION OF EGOCENTRIC SPEECH IS 0.40 OR GREATER AND THE VERBAL PROPORTIONS FOR CHILDREN WHOSE PROPORTION OF EGOCENTRIC SPEECH IS 0.25 OR LESS

Categories of Bales' Interaction Process Analysis	Proportion of Egocentric Speech is 0.40 or Greater		Proportion of Egocentric Speech is 0.25 or Less
1. Seems Friendly	P	$<$	P
2. Dramatizes	P	$=$	P
3. Agrees	P	$<$	P
4. Gives Suggestion	P	$\leqslant$	P
5. Gives Opinion	P	$\leqslant$	P
6. Gives Information	P	$\leqslant$	P
7. Asks for Information	P	$\leqslant$	P
8. Asks for Opinion	P	$\leqslant$	P
9. Asks for Suggestion	P	$\leqslant$	P
10. Disagrees	P	$>$	P
11. Shows Tension	P	$=$	P
12. Seems Negative	P	$>$	P

distinguishes the socialized speaker from the egocentric speaker is the ability to consider the notion of points of view. This egocentrism of thought is reflected in his speech. After age 7 or 8 the child considers the notion of points of view and uses the information to adapt his speech and to communicate effectively with others.

The research on role-taking suggested that the child improves in his ability to adopt the perspective or attitudes of others with increasing age (Cohen & Klein, 1968; Devries, 1970; Flavell et al., 1968; Marvin et al., 1976; Menig-Peterson, 1975; Miller et al., 1976; Salatas & Flavell, 1976). This period of improvement extended from approximately 4 years to early adolescence (Flavell et al., 1968; Marvin et al., 1976) and appeared to be unaffected by the sex of the child or the situation except possibly during the preschool years (Krauss & Glucksberg, 1968; Peterson et al., 1972). Role-taking appeared to be linked with communicative effectiveness (Flavell et al., 1968; Hoffman, 1975).

In light of this, it was suggested that the older the child the more effective he will be in meeting the verbal requests of his partner and the more closely his verbal behavior will complement that behavior of his partner. This suggested the following hypothesis.

Hypothesis 5. There will be an increasing positive relationship between the verbal profiles of the dyad with an increase in age.

The limited research on the nonverbal behavior of children suggested that age and the sex of the subject may influence certain nonverbal behaviors (Aiello & Aiello, 1974; Ashear & Snortum, 1977; Bass & Weinstein, 1971; Guardo, 1969; Hamilton, 1973; Levine & Sutton-Smith, 1972; Lord, 1974; Musels & Guardo, 1969; Odom & Lemond, 1972; Pederson, 1973; Post & Hetherington, 1974). However, a detailed investigation by Galejs (1974) did not find age or sex differences between the nonverbal behaviors of same-sex dyads. Situational influences on the nonverbal behavior of children have been reported (Bass & Weinstein, 1971; Guardo, 1969).

These results suggested the following hypotheses.

Hypothesis 6. There will be a significant difference between situations but not between same-sex dyads or age groups on the nonverbal scores.

Hypothesis 7. For a given category on the Bales' Interaction Process Analysis, the nonverbal proportions for the children in the free play situation will differ significantly from the nonverbal proportions for the children in the structured situation (see Table 2).

TABLE 2

THE PROPOSED DIFFERENCE BETWEEN THE NONVERBAL PROPORTIONS FOR CHILDREN IN A FREE PLAY SITUATION AND THE NONVERBAL PROPORTIONS FOR CHILDREN IN A STRUCTURED SITUATION

Categories of Bales' Interaction Process Analysis	Free Play Situation		Structured Situation
1. Seems Friendly	P	=	P
2. Dramatizes	P	=	P
3. Agrees	P	=	P
4. Gives Suggestion	P	<	P
5. Gives Opinion	P	<	P
6. Gives Information	P	<	P
7. Asks for Information	P	<	P
8. Asks for Opinion	P	<	P
9. Asks for Suggestion	P	<	P
10. Disagrees	P	=	P
11. Shows Tension	P	=	P
12. Seems Negative	P	=	P

Hypothesis 8. The relationship between the nonverbal profiles of the dyads will remain constant regardless of age, sex of dyad, or situation.

Much of the literature on communication implied that the verbal and nonverbal behaviors emitted by a speaker were interrelated (Barnlund, 1968; Brooks & Emmert, 1976; Clausen, 1968; Inkeles, 1968). This suggested the following hypothesis.

Hypothesis 9. There will be no significant difference between age groups, sex groups, or situations when the verbal and nonverbal frequencies are combined.

CHAPTER IV

EXPERIMENTAL PROCEDURE AND DESIGN

The Sample

The names of potential subjects in the age range of 4.0 to 4.11 years, 6.0 to 6.11 years, 8.0 to 8.11 years, and 10.0 to 10.11 years were obtained through day care centers, churches, children's gym groups, the University of Alberta married students' residence, and friends in the Edmonton and Sherwood Park areas. Contact was made with the parents and the project was discussed with them. If the parent agreed to let her child take part in the project, the parents of a friend of the same age range and sex as the child were contacted either by the first child's parents or by the experimenter. Once consents had been received from both parents and children, arrangements were made for all to attend the university for the video taping session.

The 64 subjects were comprised of 16 children from each of the 4 age groups. Each group included equal numbers of males and females. It has been suggested that socioeconomic status and single parent families could bias the results (Biller, 1970; Higgins, 1976); therefore, all children in this study were from two-parent, middle socioeconomic class families.

Study Procedure

Each subject and his friend were introduced to a free play situation and to a structured activity situation by either one of two female assistants. The first situation and the first assistant for a given pair was randomly determined.

The pair remained in a situation for a maximum of 10 minutes; however, if they finished the activity before the 10 minutes or if they requested help from the assistant more than three times during the 10 minutes, the situation was not continued. Each situation was videotaped. The free play and structured activities are discussed below.

Free Play Situation. The free play room was equipped with a variety of toys and games that were appropriate for children of 4 to 10 years (Association for Childhood Education International, 1974). A complete list may be found in Appendix A. The dyad was introduced to the room by one of the assistants. The pair were told that they could play with any of the toys. (For complete instructions see Appendix B.) The assistant then left the pair in the room returning when the 10 minutes were up or when the pair requested help. When the latter event occurred the assistant responded to the request and then left. The videotaping was discontinued

while the assistant was in the room.

Structured Activity Situation. In a recent guide to play material for children from infancy to 12 years of age, the Association for Childhood Education International (1974) recommended "interlocking building shapes" as a toy appropriate for children of 3 to 12 years. This was one of the few toys recommended in the guide that covered the age range under investigation and that appeared to lend itself to experimental control. The age range of recommendation implied that an interlocking block activity would be well within the level of comprehension for a 4 year old child and would be still within the area of interest for a 10 year old child. Although much of the literature on block activity (Farrell, 1957; Moyer & Gilmer, 1956) suggested that boys between 3 years to 7½ years spend more time playing with blocks than girls, it indicated that blocks were played with by both boys and girls. In light of this, an interlocking block activity was used in the structured situation.

In the structured activity room, there was a table, two chairs, a box of multi-colored, plastic, ½ inch to 2½ inch interlocking blocks, and a model constructed from similar blocks. The pair were introduced to the room by one of the assistants and were instructed to build a model

just like the presented model. The instructions varied according to the age of the dyad and according to the complexity of the presented model. The instructions are presented in Appendix B. To assess the level of instructional difficulty, the experimenter referred to the word lists of Stothers, Jackson, and Minkler (1947), Wepman and Hass (1969), and Thorndike (1927). To maintain a level of interest and to keep the situation as homogeneous as possible, two different models were used in the study. Pictures of the models may be seen in Appendix C. Bailey's scale of block construction (1933) was referred to when determining the level of complexity desired for a given age group. The box of blocks supplied to each dyad contained enough blocks to build one model exactly like the presented one. In addition, 4 and 6 year old dyads received an additional 12 interlocking blocks similar to the ones used to build the model while 8 and 10 year olds received an additional 40 blocks. The dyad was left alone in the room by the assistant. She returned before the 10 minutes only when the pair finished building the model or if the pair requested help. In the latter case, the assistant gave verbal assistance only and then left the pair to continue with the activity.

Instruments

Blishen Canadian Occupational Scale. The revised Blishen Canadian Occupational Scale (Blishen, 1967) was the instrument used to determine the socioeconomic level of the families in this study. The scale included 320 occupations ranked in terms of the educational and income characteristics of incumbents, obtained during the 1961 Canadian census. Since it was assumed by the author that the families' socioeconomic status was dependent upon the occupation of the husband rather than the wife when both were working only occupations characterizing the male labor force were scaled.

In this investigation, information on the fathers' occupations were requested from all potential subjects. Only those children whose fathers' occupations ranked at 30.00 or greater were considered. In the final analysis of the sample, the range for fathers' occupations extended from 33.57 to 76.69 with the median at 73.99.

Bales' Interaction Process Analysis. The Bales' Interaction Process Analysis (IPA) was used to analyze the social interaction between the subjects in this study. Three raters, including the author, were solicited from a group of graduate students who had been trained in the use of the Bales' system. Prior to analysis of the video tapes, the author

met with both of the other raters to discuss the project. At this time several sequences from the taped data were viewed. The group then underwent a brainstorming session in which the observed behaviors were scored according to the Bales' system. Behaviors that were not readily classified were discussed. The coding of such behaviors were outlined by the group and were recorded. A transcript for coding was drawn up and was made available to all raters for future reference. (See Appendix D for transcript.) The transcript was presented to a Bales' consultant to ascertain her opinion on the system being used. In addition, during the training session, Piaget's (1974) theory on thought and language in children was discussed. The raters were supplied with the definitions of egocentric and socialized speech and with the categorizing system used by Piaget (1974). Since raters were expected to identify those behaviors that met the criterion for egocentric speech, examples of egocentric speech were selected from the viewed segments.

Following the brainstorming session, raters were requested to analyze the behaviors of two children. Since the nonverbal and verbal behaviors were to be analyzed separately in this study, the coders rated the nonverbal behaviors of one child and the verbal behaviors of the other. Egocentric

speech behaviors were identified only during a verbal analysis. These behaviors were scored in the appropriate category of the Bales' IPA but were indicated by the use of a unique symbol, "L". Once an interscorer reliability of .90 or greater was obtained among the three raters on the two training segments, the raters were allowed to code the additional tapes. One rater, the experimenter, analyzed all the segments while the remaining two analyzed a total of 32 randomly determined segments. If interscorer reliability was less than .85 on a given segment, the raters reviewed the segment, discussed the behaviors, and rescored the segment.

To determine if the sum of the verbal plus nonverbal frequencies for each of the Bales' categories was equivalent to an analysis of the total interaction as defined by Bales (1950), a random sample of four subjects were coded according to Bales' defined system. The frequencies from the latter analysis was correlated with the frequencies of the summed verbal and nonverbal scores. Results showed a high positive correlation (Pearson r's--.97, .97, .96, .96) and encouraged the investigation of the effect of age, sex, and situation on the verbal plus nonverbal frequencies.

Analysis of the Data

One rater analyzed the nonverbal and the verbal behaviors of all the subjects. The data were used to test the hypotheses.

For each child in each situation the verbal, nonverbal, and verbal plus nonverbal frequencies were determined. The proportion of egocentric behavior was calculated by dividing the frequency of egocentric behavior by the total frequency of verbal behavior. In addition, the verbal and nonverbal frequencies for each of the categories of the Bales' system were determined.

To test the first, sixth, and ninth hypotheses, an analysis of variance was performed using the total frequencies for each subject. Following this, significant effects were analyzed in the following way:

1. For significant interaction effects, an analysis of the simple effects was employed to determine whether significant differences existed between means when the level of one variable was restricted.
2. For significant overall main effects and significant simple effects, the Scheffé test was used to determine the significant difference between means.

The investigator wished to determine if the variables of age, sex of the dyad, situation, or a combination of these variables influenced the verbal, nonverbal, or verbal plus nonverbal behaviors of the subjects. To test the fourth and seventh hypotheses, the frequency of each category for all subjects within the conditions under investigation were added and the proportions were determined. T-tests were used to determine the significance of the difference between group proportions for each of the categories of Bales' IPA. For the fifth and eighth hypotheses, Pearson Product Moment correlation coefficients were calculated for each of the paired subjects from the frequencies on the verbal and nonverbal profiles respectively. Using a logarithmic transformation these coefficients were transformed into Fisher Zr scores. An analysis of variance was performed upon the Fisher Zr scores. Following this, significant effects were analyzed in the following way:

1. For significant interaction effects, an analysis of the simple effects was employed to determine whether significant differences existed between means when the level of one variable was restricted.

2. For significant overall main effects and significant simple effects, the Scheffé test was used to determine the

significant difference between means.

The investigator wished to determine if the variables of age, sex of dyad, situation, or a combination of these variables influenced the relationship between the profiles of a pair. To test the second and third hypotheses, the chi square distribution determined the significance of the difference between the proportion of subjects whose proportion of egocentric speech was 0.40 or greater and those subjects whose proportion of egocentric speech was 0.25 or less. For all tests, a level of significances of 0.05 was used.

The analysis of variance is a parametric test that may be used in the analysis of data resulting from experiments which involved more than one basis for classification. In this investigation there were three bases: age of dyad, sex of dyad, and situation. The test may be used to determine what part of the total variation in the measurement results from differences due to the classification component, alone or in combination (Ferguson, 1971; Winer, 1971). However, a number of assumptions underlie the use of this model.

Assumption 1. The distribution of the dependent variable in the population from which the sample is drawn is normal (Ferguson, 1971, p. 29).

Assumption 2. The variances in the population from which the samples are drawn are equal. This is known as homogeneity of variance (Ferguson, 1971, p. 219).

Assumption 3. The effects of various factors on the total variation are additive (Ferguson, 1971, p. 219).

Assumption 4. The errors must be independent (Gaito, 1970, p. 39).

Assumption 5. The variables involved must be measurable by an interval scale (Gaito, 1970, p. 39).

Assumption 6. The variance-covariance matrix must have compound symmetry (Winer, 1971).

Gaito (1970) reported that not all investigators agree on the number of assumptions required for the use of this model. All appeared to include Assumptions 1, 2, 4, and 6. With regards to the first assumption, it must be applied to many of the nonparametric tests as well as to the analysis of variance model. With regards to the second and fourth assumptions, Ferguson (1971) stated that

> one advantage of the analysis of variance is that reasonable departure from the assumptions of normality and homogeneity may occur without seriously affecting the validity of the inferences drawn from the data. (p. 219)

Winer (1971) supported this position. He also suggested

that the analysis of variance was robust to reasonable departure from the assumption of compound symmetry. He implied that compound symmetry of the variance-covariance matrix was a sufficient condition for the F-ratio to have an F distribution; however, it was not a necessary condition.

The t-test is a parametric test and is supported by many of the same assumptions that underlie the analysis of variance (Boneau, 1960; Ferguson, 1971). Like the analysis of variance, this test is a robust test and is not seriously affected by reasonable departures from the assumptions of normality and homogeneity.

The other test used in this study is the chi square distribution. This is a nonparametric test and has few underlying assumptions (Ferguson, 1971; Gaito, 1970). Probability statements on the significant difference between groups are exact regardless of the shape of the population distribution from which the sample is drawn (Gaito, 1970).

Limitations of the Study

This study has a number of limitations that must be considered.

1. A volunteer sample was used. Thus, the study was subject to the limitations of volunteer research (Rosenthal & Rosnow, 1975).

2. The majority of subjects were from families of the upper middle socioeconomic level. The sample may not be representative of the middle socioeconomic level.

3. Although all subjects were paired with a friend, the quality of the relationship was not experimentally controlled. Researchers have not investigated the effects of the "degree of positive friendship" on children's social interaction; however, they have suggested differences in interaction between "liked" and "disliked" peers (Hartup, 1964; Hartup, Glazer, & Charlesworth, 1967; Tiktin & Hartup, 1965).

4. The task for the 4 and 6 year olds in the structured activity was generally completed by 6 year olds in 3 to 5 minutes. For the analysis of the data, the frequencies for 6 year olds were changed to reflect a 10 minute period. This may have biased the results.

5. The data collected in this investigation may not meet the assumptions underlying the analysis of variance model or the t-distribution; however, both models are robust with respect to reasonable departures from the assumptions of normality and homogeneity (Boneau, 1960; Ferguson, 1971; Gaito, 1970; Winer, 1971).

CHAPTER V

RESULTS

The results are reported by restating the hypotheses, presenting the pertinent statistics, and drawing the appropriate conclusions. The level of significance used to test the nine hypotheses was $p < .05$.

The first hypothesis was stated as follows:

Hypothesis 1. There will be a significant difference between age groups and situations but not between sex groups on the verbal scores.

An analysis of variance was performed using the subject's total frequency of verbal behaviors. The results are reported in Table 3. The obtained values indicated a significant age by situation effect as well as a significant situation effect and age effect. Therefore hypothesis 1 was partially supported.

Conclusions. Following an analysis of the simple main effects it was found that:

1. For the structured activity, age means differed significantly.
2. For 4 year olds, 6 year olds, and 10 year olds, situations differed significantly. The results are reported in Table 4.

TABLE 3

THREE WAY ANALYSIS OF VARIANCE

THE EFFECTS OF AGE, SEX, AND SITUATION ON

THE VERBAL BEHAVIORS

Source of Variation	SS	df	MS	F
Between Subjects				
Age	18,431.41	3	6,143.80	3.63 *
Sex	3,061.53	1	3,061.53	1.81
Age x sex	7,144.53	3	2,381.51	1.41
Error	94,730.00	56	1,691.61	
Within Subjects				
Situation	37,196.28	1	37,196.28	38.60 **
Age x situation	16,196.78	3	5,398.93	5.60 **
Sex x situation	413.28	1	413.28	.43
Age x sex x situation	2,061.16	3	687.05	.71
Error	53,959.5	56	963.56	

Note. $F(1,56) = 4.02$, $p < .05$; $F(1,56) = 7.14$, $p < .01$.
$F(3,56) = 2.78$, $p < .05$; $F(3,56) = 4.17$, $p < .01$.

* $p < .05$.
** $p < .01$.

TABLE 4

ANALYSIS OF VARIANCE

SIMPLE MAIN EFFECTS ON

THE VERBAL BEHAVIORS

Source of Variation	SS	df	MS	F
Age				
Structured situation	24,036.88	3	8,012.29	6.04 *
Free play	10,591.32	3	3,530.42	2.66
Error		56	1,327.59	
Situation				
4 years	12,920.88	1	12,920.88	13.401 **
6 years	25,764.5	1	25,764.5	26.739 **
8 years	87.78	1	87.78	.091
10 years	14,620.51	1	14,620.51	15.17 **
Error		56	963.56	

Note. $F(1,56) = 4.02$, $p < .05$; $F(1,56) = 7.14$, $p < .01$.
$F(3,56) = 2.78$, $p < .05$, $F(3,56) = 4.17$, $p < .01$.

* $p < .05$.
** $p < .01$.

From the Scheffé test on the means for significant overall main effects and simple effects, the following was found:

1. For the level of structured activity, the means for 4 and 6 year olds differed significantly from 8 year olds. The results are reported in Table 5.

2. Four year olds differed from 10 year olds. The results are reported in Table 6.

Hypothesis 2. Forty percent or more of the verbal scores for each child between 4 and 7 years will be scored as egocentric speech.

Hypothesis 3. Twenty-five percent or less of the verbal scores for each child of 8 years or more will be scored as egocentric speech.

A chi square was used to test these two hypotheses. The results are reported in Table 7. The obtained values were not significant at the .05 level. Therefore, hypothesis 2 and hypothesis 3 were rejected.

Conclusions. The children of 4 and 6 years did not differ significantly from the 8 and 10 year olds in the percentage of egocentric speech in this study.

Hypothesis 4. For a given category on the Bales' Interaction Process Analysis, the verbal proportion for the group of children whose proportion of egocentric speech is 0.40 or

TABLE 5

SCHEFFÉ TESTS ON ALL PAIRS OF TOTALS

SIGNIFICANT SIMPLE MAIN EFFECTS ON

THE VERBAL BEHAVIORS

Age for Structured Activity:

Age		4	6	10	8	
	Totals	1019	1132	1485	1808	
4	1019	000	113	466	789	*
6	1132		000	353	676	*
10	1485			000	323	
8	1808				000	

Note. Critical value = 594.62.

* $p < .05$.

TABLE 6

SCHEFFÉ TESTS ON THE

SIGNIFICANT AGE EFFECT

VERBAL BEHAVIORS

Age		4	6	8	10
	Totals	2681	3172	3563	3654
4	2681	000	491	882	973 *
6	3172		000	391	482
8	3563			000	91
10	3654				000

Note. Critical value = 949.25.

* $p < .05$.

TABLE 7

CONTINGENCY TABLES (χ^2)

PERCENTAGE OF EGOCENTRIC SPEECH

1. 40 Percent

		Egocentric Speech $\geq .40$	Egocentric Speech $< .40$	
Age	4 to 6	1	31	32
	8 to 10	0	32	32
		1	63	64

$\chi^2 = 1.016$, $\underline{df} = 1$

Note. $\chi^2(\underline{df} = 1) = 3.84$, $\underline{p} < .05$.

2. 25 Percent

		Egocentric Speech $\geq .25$	Egocentric Speech $< .25$	
Age	4 to 6	3	29	32
	8 to 10	1	31	32
		4	60	64

$\chi^2 = 1.067$, $\underline{df} = 1$

Note. $\chi^2(\underline{df} = 1) = 3.84$, $\underline{p} < .05$

greater will differ significantly from the verbal proportion for the group whose proportion of egocentric speech is 0.25 or less. (See Table 1, p. 36.)

In this study, it was not possible to investigate this hypothesis. Only one subject out of a total of 64 subjects had a percentage for egocentric speech of 40 or greater. Sixty-one subjects obtained percentage scores of 25 or less.

Hypothesis 5. There will be an increasing positive relationship between the verbal profiles of the dyad with an increase in age.

Pearson Product Moment correlation coefficients were calculated for each of the paired subjects from the frequencies of the verbal profiles. Since the correlation distribution is not a normal distribution, these coefficients were transformed to Fisher's Zr scores. The results are reported in Appendix E. An analysis of variance was performed upon the Fisher's Zr scores. The results are reported in Table 8. The obtained results show a significant interaction effect for sex and situation as well as a significant overall main effect for age. Therefore, hypothesis 5 was partially rejected.

Conclusions. Following an analysis of the simple main effects it was found that:

TABLE 8

THREE WAY ANALYSIS OF VARIANCE

THE EFFECTS OF AGE, SEX, AND SITUATION ON

THE RELATIONSHIP BETWEEN THE VERBAL PROFILES

Source of Variation	SS	df	MS	F	
Between Subjects					
Age	5.163	3	1.721	5.10	**
Sex	.553	1	.553	1.64	
Age x sex	.886	3	.295	.875	
Error	8.100	24	.338		
Within Subjects					
Situation	.340	1	.340	.130	
Age x situation	2.159	3	.720	2.744	
Sex x situation	1.773	1	1.773	6.750	*
Age x sex x situation	.660	3	.220	.840	
Error	6.301	24	.263		

Note. $F(1,24) = 4.26$, $p < .05$; $F(1,24) = 7.82$, $p < .01$.
$F(3,24) = 3.01$, $p < .05$; $F(3,24) = 4.72$, $p < .01$.

* $p < .05$.
** $p < .01$.

1. At a situational level of structured activity, there was a significant difference between males and females favoring females. Results are reported in Table 9.

From the Scheffé tests, the means for the significant overall main effect, the following was found.

1. As reported in Table 10, the means of the verbal relationship for 4 and 6 year olds differed from the means for 8 and 10 year olds.

Hypothesis 6. There will be a significant difference between situations but not between same-sex dyads or age groups on the nonverbal criterion.

An analysis of variance was performed using the subject's total frequency for nonverbal behaviors. The results are reported in Table 11. The obtained results indicated a significant triple interaction effect, significant age by situation, and age by sex interaction effects as well as significant main effects for age and situation. Therefore, hypothesis 6 was partially supported.

Conclusions. Following an analysis of the simple effects it was found that:

1. For the structured activity, age by sex groups and age groups differed significantly (see Table 12).

TABLE 9

ANALYSIS OF VARIANCE

SIMPLE MAIN EFFECTS ON THE RELATIONSHIP

BETWEEN THE VERBAL PROFILES

Source of Variation	SS	df	MS	F
Situation				
Males	1.149	1	1.149	3.41
Females	.658	1	.658	1.95
Error		24	.337	
Sex				
Structured situation	2.153	1	2.153	7.18 *
Free play	.176	1	.176	.59
Error		24	.300	

Note. $F(1,24) = 4.26$, $p < .05$; $F(1,24) = 7.82$, $p < .01$.
$F(3,24) = 3.01$, $p < .05$; $F(3,24) = 4.72$, $p < .01$.

* $p < .05$.
** $p < .01$.

TABLE 10

SCHEFFÉ TESTS ON ALL ORDERED PAIRS OF TOTALS

SIGNIFICANT MAIN EFFECT ON THE

RELATIONSHIP BETWEEN VERBAL PROFILES

Age		4	6	8	10
	Totals	11.86	15.45	20.78	23.55
4	11.86	0.00	3.59	8.92 *	11.69 *
6	15.45		0.00	5.33 *	8.10 *
8	20.78			0.00	2.77
10	23.55				0.00

Note. Critical value = 4.93.

* $p < .05$.

TABLE 11

THREE WAY ANALYSIS OF VARIANCE

THE EFFECTS OF AGE, SEX, AND SITUATION ON

THE NONVERBAL BEHAVIORS

Source of Variation	SS	df	MS	F
Between subjects				
Age	97,329.1	3	32,443.03	11.17 **
Sex	630.13	1	630.13	.22
Age x sex	31,017.74	3	10,339.25	3.56 *
Error	162,598.25	56	2,903.54	
Within subjects				
Situation	159,612.5	1	159,612.5	107.52 **
Age x situation	15,836.12	3	5,278.71	3.55 *
Sex x situation	472.78	1	472.78	.32
Age x sex x situation	46,254.35	3	15,418.17	10.39 **
Error	83,131.25	56	1,484.49	

Note. $F(1,56) = 4.02$, $p < .05$; $F(1,56) = 7.14$, $p < .01$.
$F(3,56) = 2.78$, $p < .05$; $F(3,56) = 4.17$, $p < .01$.

* $p < .05$.
** $p < .01$.

2. For free play, age groups differed significantly (see Table 13).

3. For females, age by situation means and age means differed significantly (see Table 12).

4. For 4 year olds, sex by situation groups, situation groups, and sex groups differed significantly (see Table 12, 13, 14).

5. For 6 year olds, situations differed significantly (see Table 13).

6. For 8 year olds, sex by situation groups and situation groups differed significantly (see Tables 12, 13).

7. For 10 year olds, sex by situation and situation groups differed significantly (see Tables 12, 13).

From the Scheffé test the means differed as follows:

1. For the structured activity, 4 year old females differed significantly from 4 year old, 8 year old, and 10 year old males as well as 8 year old and 10 year old females. Four and 6 year olds differed significantly from 8 and 10 year olds (see Tables 15, 17).

2. For the free play situation, 4 and 6 year olds differed from 8 and 10 year olds (see Table 16).

3. For females, 4 and 6 year olds in a structured activity differed significantly from all other situation by age groups. Four and 6 year olds differed from 8 and 10 year

TABLE 12

ANALYSIS OF VARIANCE

SIMPLE INTERACTION EFFECTS ON THE NONVERBAL BEHAVIORS

Source of Variation	SS	df	MS	F
Age x Sex				
Structured situation	76,032.55	3	25,344.18	11.552 **
Free play	1,239.56	3	413.19	.188
Error		56	2,194.02	
Age x Situation				
Males	16,091.06	3	5,363.69	2.445
Females	45,999.42	3	15,333.14	6.987 **
Error		56	2,194.02	
Sex x Situation				
4 years	21,892.79	1	21,892.79	9.978 **
6 years	731.54	1	731.54	.333
8 years	9,695.29	1	9,695.29	4.419 *
10 years	14,407.54	1	14,407.54	6.567 *
Error		56	2,194.02	

Note. $F(1,56) = 4.02$, $p < .05$; $F(1,56) = 7.14$, $p < .01$.
$F(3,56) = 2.78$, $p < .05$; $F(3,56) = 4.17$, $p < .01$.

* $p < .05$.

** $p < .01$.

TABLE 13

ANALYSIS OF VARIANCE

SIMPLE MAIN EFFECTS

ON NONVERBAL BEHAVIORS

Source of Variation	SS	df	MS	F
Age				
Structured situation	82,514.92	3	27,504.97	12.54 **
Free Play	30,650.29	3	10,216.76	4.66 **
Error		56	2,194.02	
Situation				
4 years	63,635.28	1	63,635.28	42.87 **
6 years	49,062.78	1	49,062.78	33.05 **
8 years	8,547.78	1	8,547.78	5.76 *
10 years	54,202.78	1	54,202.78	36.51 **
Error		56	1,484.49	

Note. $F(1,56) = 4.02$; $p < .05$; $F(1,56) = 7.14$, $p < .01$.
$F(3,56) = 2.78$, $p < .05$; $F(3,56) = 4.17$, $p < .01$.

* $p < .05$.
** $p < .01$.

TABLE 14

ANALYSIS OF VARIANCE

SIMPLE MAIN EFFECTS

ON NONVERBAL BEHAVIORS

Source of Variation	SS	df	MS	F
Age				
Males	20,007.29	3	6,669.10	2.29
Females	108,339.54	3	36,113.18	12.44 **
Error		56	2,903.54	
Sex				
4 years	23,598.78	1	23,598.78	8.13 **
6 years	385.03	1	385.03	.13
8 years	2,983.78	1	2,983.78	1.03
10 years	4,680.28	1	4,680.28	1.61
Error		56	2,903.54	

Note. $F(1,56) = 4.02$, $p < .05$; $F(1,56) = 7.14$, $p < .01$.
$F(3,56) = 2.78$, $p < .05$; $F(3,56) = 4.17$, $p < .01$.

* $p < .05$.
** $p < .01$.

TABLE 15

SCHEFFÉ TESTS ON ALL PAIRS OF TOTALS

SIGNIFICANT SIMPLE INTERACTION EFFECTS

ON THE NONVERBAL BEHAVIORS

Age x Sex for Structured Activity

		4F	6F	6M	10M	4M	8M	10F	8F
	Totals	770	1144	1276	1348	1623	1662	1881	2095
4F	770	000	374	506	578 *	853 *	892 *	1111 *	1325 *
6F	1144		000	132	204	479	518	737 *	951 *
6M	1276			000	72	347	386	605 *	819 *
10M	1348				000	275	314	533	747 *
4M	1623					000	39	258	472
8M	1662						000	219	433
10F	1881							000	214
8F	2095								000

Table 15 continued

Age x Situation for Females

		4SA	6SA	6FP	10SA	4FP	8FP	8SA	10FP
	Totals	770	1144	1847	1881	1902	2078	2095	2200
4SA	770	000	374	1077 *	1111 *	1132 *	1308 *	1325 *	1430 *
6SA	1144		000	703 *	737 *	758 *	934 *	951 *	1056 *
6FP	1847			000	34	55	231	248	353
10SA	1881				000	21	197	214	319
4FP	1902					000	176	193	298
8FP	2078						000	17	122
8SA	2095							000	105
10FP	2200								000

Note. Critical Value = 540.56.

* $p < .05$.

Table 15 continued

Sex x Situation for 4 Year Olds

		F.SA	M.SA	F.FP	M.FP
	Totals	770	1623	1902	1918
F.SA	770	000	853 *	1132 *	1148 *
M.SA	1623		000	279	295
F.FP	1902			000	16
M.FP	1918				000

Sex x Situation for 8 Year Olds

		M.SA	F.FP	F.SA	M.FP
	Totals	1662	2078	2095	2202
M.SA	1662	000	416 *	433 *	540 *
F.FP	2078		000	17	124
F.SA	2095			000	107
M.FP	2202				000

Table 15 continued

Sex x Situation for 10 Year Olds

		M.SA	F.SA	F.FP	M.FP
	Totals	1348	1881	2200	2346
M.SA	1348	000	533 *	852 *	998 *
F.SA	1881		000	319	465 *
F.FP	2200			000	146
M.FP	2346				000

Notes. Critical value = 376.27.

M = Male.

F = Female.

SA = Structured Activity.

FP = Free Play Activity.

* $p < .05$.

TABLE 16

SCHEFFÉ

NONVERBAL BEHAVIORS

IN FREE PLAY

Age		6	4	8	10
	Totals	3673	3820	4280	4546
6	3673	000	147	607 *	873 *
4	3820		000	460 *	726 *
8	4280			000	266
10	4546				000

Note. Critical value = 331.01.

* $p < .05$.

TABLE 17

SCHEFFÉ

NONVERBAL BEHAVIORS

IN STRUCTURED ACTIVITY

Age		4	6	10	8
	Totals	2393	2420	3229	3757
4	2393	000	27	836 *	1364 *
6	2420		000	809 *	1337 *
10	3229			000	528 *
8	3757				000

Note. Critical value = 331.01.

* $p < .05$.

olds (see Tables 15, 18).

4. For 4 year olds, females in a structured activity differed from males in a structured activity, males in free play, and females in free play (see Table 15).

5. For 8 year olds, males in a structured activity differed from all other groups (see Table 15).

6. For 10 year olds, males in a structured activity differed from all other groups (see Table 15).

7. Four and 6 year olds differed from 8 and 10 year olds (see Table 19).

Hypothesis 7: For a given category on the Bales' Interaction Process Analysis, the nonverbal proportions for the children in the free play situation will differ significantly from the nonverbal proportions for the children in the structured situation (see Table 20--repeat of Table 2).

Z-tests were performed on the group proportions. The results are reported in Table 21.

The obtained values were statistically significant at a .05 level except for those in category 3, agrees, and those in category 9, asks for suggestions. Therefore, the hypothesis was partially supported.

Conclusions. As was suggested in the hypothesis there was a significant difference between the group's nonverbal

TABLE 18

SCHEFFÉ

NONVERBAL BEHAVIOR FOR FEMALES

Age		4	6	10	8
	Totals	2672	2991	4081	4173
4	2672	000	319	1409 *	1501 *
6	2991		000	1090 *	1182 *
10	4081			000	92
8	4173				000

Note. Critical value = 380.79.

* $p < .05$.

TABLE 19

SCHEFFÉ TEST ON THE

SIGNIFICANT MAIN EFFECT FOR AGE

NONVERBAL BEHAVIORS

Age		6	4	10	8
	Totals	6093	6213	7775	8037
6	6093	000	120	1682 *	1944 *
4	6213		000	1562 *	1824 *
10	7775			000	262
8	8037				000

Note. Critical value = 1243.67.

* $p < .05$.

TABLE 20

THE PROPOSED DIFFRENCE BETWEEN THE NONVERBAL PROPORTIONS FOR CHILDREN IN A FREE PLAY SITUATION AND THE NONVERBAL PROPORTIONS FOR CHILDREN IN A STRUCTURED SITUATION

Categories of Bales' Interaction Process Analysis	Free Play Situation		Structured Situation
1. Seems Friendly	P	=	P
2. Dramatizes	P	=	P
3. Agrees	P	=	P
4. Gives Suggestion	P	<	P
5. Gives Opinion	P	<	P
6. Gives Information	P	<	P
7. Asks for Information	P	<	P
8. Asks for Opinion	P	<	P
9. Asks for Suggestion	P	<	P
10. Disagrees	P	=	P
11. Shows Tension	P	=	P
12. Seems Negative	P	=	P

Note. Table 20 is a repeat of Table 2, p. 39.

TABLE 21

Z-TESTS

THE DIFFERENCE BETWEEN THE NONVERBAL PROPORTION FOR THE CHILDREN IN FREE PLAY AND FOR THE CHILDREN IN THE STRUCTURED ACTIVITY

	Free Play Situation	Structured Situation	Z-value
1. Seems Friendly	.09	.08	3.33 *
2. Dramatizes	.61	.04	78.33 *
3. Agrees	.00	.00	.00
4. Gives Suggestion	.08	.46	-78.33 *
5. Gives Opinion	.01	.06	-25.00 *
6. Gives Information	.00	.02	-20.00 *
7. Asks for Information	.00	.01	-11.11 *
8. Asks for Opinion	.00	.02	-20.00 *
9. Asks for Suggestion	.01	.01	.00
10. Disagrees	.00	.01	-10.00 *
11. Shows Tension	.24	.26	- 3.33 *
12. Seems Negative	.05	.03	6.67 *

Note. $Z_{.05} = 1.64$ (one-tailed).
$Z_{.05} = 1.96$ (two-tailed).

* $p < .05$.

proportion in categories 4 through to 8. The proportions were greater for the structured activity situation than for the free play. However, unlike the hypothesis suggested, categories 1, 2, 10, 11, and 12 showed significant differences between groups. In categories 10 and 11, the proportions were significantly greater in the structured activity than in the free play while with categories 1, 2, and 12, the proportions were significantly greater in the free play situation.

Hypothesis 8. The relationship between the nonverbal profiles of the dyad will remain constant regardless of age, sex of dyad, or situation.

Pearson Product Moment correlation coefficients were calculated for each of the paired subjects from the frequencies of the nonverbal profiles. Since the correlation distribution was not normally distributed, these coefficients were transformed to Fisher Zr scores. The results are reported in Appendix E. An analysis of variance was performed upon the Fisher Zr scores. The results are reported in Table 22. The obtained results indicated significant sex by situation and age by sex interaction effects as well as significant age and situation effects. Therefore, hypothesis 8 was partially supported.

TABLE 22

THREE WAY ANALYSIS OF VARIANCE

THE EFFECTS OF AGE, SEX, AND SITUATION ON

THE RELATIONSHIP BETWEEN THE NONVERBAL PROFILES

Source of Variation	SS	df	MS	F
Between Subjects				
Age	5.362	3	1.787	5.30 **
Sex	.836	1	.836	.25
Age x sex	4.826	3	1.609	4.77 **
Error	8.100	24	.337	
Within Subjects				
Situation	3.862	1	3.862	6.48 **
Age x situation	.813	3	.271	.45
Sex x situation	5.070	1	5.070	8.45 **
Age x sex x situation	.266	3	.888	1.48
Error	14.305	24	.60	

Note. $F(1,24) = 4.26$, $p < .05$; $F(1,24) = 7.82$, $p < .01$.
$F(3,24) = 3.01$, $p < .05$; $F(3,24) = 4.72$, $p < .01$.

* $p \leq .05$.
** $p < .01$.

Conclusions. Following an analysis of the simple effects it was found that:

1. For the structured activity, sex groups differed significantly.
2. For females, situations differed significantly.
3. For males, age groups differed significantly.
4. For 10 year olds, males differed significantly from females.

The results are reported in Table 23.

For the Scheffé test, the results showed the following:

1. For males, 4, 6, and 8 year olds differed significantly from 10 year olds (see Table 24).
2. Four and 6 year olds differed from 8 and 10 year olds (see Table 25).

Hypothesis 9. There will be no significant difference between age groups, sex groups, or situations when the verbal and nonverbal frequencies are combined.

An analysis of variance was performed. The results were presented in Table 26. The obtained values indicated a significant triple interaction effect, a significant sex by situation effect, as well as significant situation and age effects. Therefore, hypothesis 9 was rejected.

TABLE 23

ANALYSIS OF VARIANCE

SIMPLE MAIN EFFECTS ON THE RELATIONSHIP

BETWEEN THE NONVERBAL PROFILES

Source of Variation	SS	df	MS	F	
Sex					
Structured	3.229	1	3.229	6.91	*
Free play	1.926	1	1.926	4.12	
Error		24	.467		
Situation					
Males	8.879	1	8.879	14.898	**
Females	.041	1	.041	.069	
Error		24	.60		
Age					
Males	7.470	3	2.49	7.37	**
Females	2.711	3	.904	2.68	
Error		24	.338		
Sex					
4 years	.064	1	.064	.19	
6 years	1.228	1	1.228	3.63	
8 years	1.441	1	1.441	4.26	
10 years	2.169	1	2.169	6.42	*
Error		24	.338		

Note. $F(1,24) = 4.26$, $p < .05$; $F(1,24) = 7.82$, $p < .01$.
$F(3,24) = 3.01$, $p < .05$; $F(3,24) = 4.72$, $p < .01$.

* $p < .05$.
** $p < .01$.

TABLE 24

SCHEFFÉ TESTS ON ALL PAIRS OF TOTALS

SIGNIFICANT SIMPLE MAIN EFFECT ON THE

RELATIONSHIP BETWEEN NONVERBAL PROFILES

Males:

Age		6	4	8	10	
	Totals	10.007	12.049	12.795	20.229	
6	10.007	000	2.042	2.788	10.222	*
4	12.049		000	.746	8.180	*
8	12.795			000	7.434	*
10	20.229				000	

Note. Critical value = 4.939.

* $p < .05$.

TABLE 25

SCHEFFÉ TEST ON THE

RELATIONSHIP BETWEEN NONVERBAL PROFILES

Age		4	6	8	10
	Totals	23.06	24.45	30.40	34.57
4	23.06	000	1.39	7.34 *	11.51 *
6	24.45		000	5.95 *	10.12 *
8	30.40			000	4.17
10	34.57				000

Note. Critical value = 4.93.

* $p < .05$.

TABLE 26

THREE WAY ANALYSIS OF VARIANCE

THE EFFECTS OF AGE, SEX, AND SITUATION ON

THE NONVERBAL PLUS VERBAL BEHAVIORS

Source of Variation	SS	df	MS	F
Between subjects				
Age	217,979.71	3	72,659.90	10.62 **
Sex	1,561.00	1	1,561.00	.23
Age x sex	46,502.53	3	15,500.84	2.27
Error	383,154.69	56	6,842.05	
Within subjects				
Situation	387,750.19	1	387,750.19	121.46 **
Age x situation	2,354.7	3	784.9	.25
Sex x situation	76,829.84	1	76,829.84	24.07 **
Age x sex x situation	38,261.33	3	12,753.78	3.99 *
Error	178,773.44	56	3,192.38	

Note. $F(1,56) = 4.02$, $p < .05$; $F(1,56) = 7.14$, $p < .01$.
$F(3,56) = 2.78$, $p < .05$; $F(3,56) = 4.17$, $p < .01$.

* $p < .05$.
** $p < .01$.

Conclusions. From the analysis of the simple effects the following was found:

1. For the structured activity, a significant age by sex interaction was found (see Table 27).

2. For females, a significant age by situation and a situation effect was found (see Tables 27, 28).

3. For males, a significant age by situation and a situation effect was found (see Tables 27, 28).

From the Scheffé test it was found that:

1. For the structured activity, 8 year old females differed significantly from 4, 6, and 10 year old males and from 4 and 6 year old females. Four year old females differed significantly from 8 and 10 year old males and females; while 6 year old females differed significantly from 8 year old males and 8 and 10 year old females (see Table 29).

2. For females, 4 year olds and 6 year olds in a structured situation differed significantly from all other groups except for each other (see Table 29).

3. For males, 4 and 6 year olds in a structured activity differed significantly from 4, 6, 8, and 10 year olds in a free play situation. Ten year olds in a structured activity differed significantly from 6, 8, and 10 year olds in a free play situation while 8 year olds in a structured activity

TABLE 27

ANALYSIS OF VARIANCE

SIMPLE INTERACTION EFFECTS ON

THE VERBAL PLUS NONVERBAL BEHAVIORS

Source of Variation	SS	df	MS	F
Age x Sex				
Structured	79,334.05	3	26,444.68	5.27 **
Free play	5,429.81	3	1,809.94	.36
Error		56	5,017.22	
Age x Situation				
Males	19,941.17	3	6,647.06	3.32 *
Females	95,150.0	3	31,716.67	6.32 **
Error		56	5,017.22	
Sex x Situation				
4 years	14,365.13	1	14,365.13	2.86
6 years	84.5	1	84.5	.02
8 years	17,020.13	1	17,020.13	3.39
10 years	9,146.29	1	9,146.29	1.82
Error		56	5,017.22	

Note. $F(1,56) = 4.02$, $p < .05$; $F(1,56) = 7.14$, $p < .01$.
$F(3,56) = 2.78$, $p < .05$; $F(3,56) = 4.17$, $p < .01$.

* $p < .05$.
** $p < .01$.

TABLE 28

ANALYSIS OF VARIANCE

SIMPLE MAIN EFFECTS ON

VERBAL PLUS NONVERBAL BEHAVIORS

Source of Variation	SS	df	MS	F
Sex				
Structured situation	40.64	1	40.64	.008
Free play	3,875.06	1	3,875.06	.772
Error		56	5,017.22	
Situation				
Males	225,268.89	1	225,268.89	70.56 **
Females	164,835.99	1	164,835.99	51.63 **
Error		56	3,192.38	

Note. $F(1,56) = 4.02$, $p < .05$; $F(1,56) = 7.14$, $p < .01$.
$F(3,56) = 2.78$, $p < .05$; $F(3,56) = 4.17$, $p < .01$.

* $p < .05$;
** $p < .01$.

TABLE 29

SCHEFFÉ TESTS ON ALL PAIRS OF TOTALS

SIGNIFICANT SIMPLE INTERACTION EFFECTS ON

THE NONVERBAL PLUS VERBAL BEHAVIORS

Age x Sex for Structured Activity

		4F	6F	6M	4M	10M	8M	10F	8F
	Totals	1202	1621	1936	1942	2040	2544	2669	3021
4F	1202	000	419	734	740	838 *	1342 *	1467 *	1819 *
6F	1621		000	315	321	419	923 *	1048 *	1400 *
6M	1936			000	6	104	608	733	1085 *
4M	1942				000	98	602	727	1079 *
10M	2040					000	504	629	981 *
8M	2544						000	125	477
10F	2669							000	352
8F	3021								000

Critical Value = 817.39, $p < .05$.

Table 29 continued

Age x Situation for Females

		4SA	6SA	10SA	4FP	6FP	8FP	8SA	10FP
	Totals	1202	1621	2669	2710	2725	2857	3021	3469
4SA	1202	000	419	1467 *	1508 *	1523 *	1655 *	1819 *	2267 *
6SA	1621		000	1048 *	1089 *	1104 *	1236 *	1400 *	1848 *
10SA	2669			000	41	56	188	352	800
4FP	2710				000	15	147	311	759
6FP	2725					000	132	296	744
8FP	2857						000	164	612
8SA	3021							000	448
10FP	3469								000

Critical Value = 817.39, $p < .05$.

Table 29 continued

Age x Situation for Males

		6SA	4SA	10SA	8SA	4FP	6FP	8FP	10FP
	Totals	1936	1942	2040	2544	2772	2988	3118	3381
6SA	1936	000	008	104	608	836 *	1052 *	1182 *	1445 *
4SA	1942		000	98	602	830 *	1046 *	1176 *	1439 *
10SA	2040			000	504	732	948 *	1078 *	1341 *
8SA	2544				000	228	444	574	837 *
4FP	2772					000	216	346	609
6FP	2988						000	130	393
8FP	3118							000	263
10FP	3381								000

Critical value = 817.39, $p < .05$.

differed significantly from 10 year olds in a free play situation (see Table 29).

4. The means for 8 and 10 year olds are significantly different from the means of 4 and 6 year olds (see Table 30).

Summary

In summary, three of the nine hypotheses were rejected while the remaining six were partially supported at an alpha level of .05. Contrary to what had been postulated in the latter six hypotheses, the results indicated that the variables of age, sex, and situation invariably influenced the verbal, nonverbal, or verbal plus nonverbal scores at an interaction level. This became apparent when the verbal frequencies scores were analyzed. A summary of results (see Table 31) indicated that:

1. For the structured activity, 8 year olds emitted significantly more verbal behaviors than 4 year olds and 6 year olds.

2. For 4 year olds, the frequency of verbal behaviors was greater in the free play situation than in the structured activity. This holds true for 6 and 10 year olds.

3. Four year olds emitted significantly fewer verbal behaviors than 10 year olds.

4. Significantly more verbal behaviors were presented in

TABLE 30

SCHEFFÉ TESTS ON THE

VERBAL AND NONVERBAL BEHAVIORS

Age		4	6	8	10
	Totals	8626	9270	11540	11559
4	8626	000	644	2914 *	2933 *
6	9270		000	2270 *	2289 *
8	11540			000	19
10	11559				000

Note. Critical value = 954.56.

* $p < .05$.

TABLE 31

A SUMMARY OF THE

SIGNIFICANT VERBAL EFFECTS

Structured Activity

4 + 6 < 8

4 Years

SA < FP

6 Years

SA < FP

10 Years

SA < FP

Situations

SA < FP

Age

4 < 10

Notes. FP = Free play.

SA = Structured activity.

F = Female.

M = Male.

4, 6, 8, 10 = years.

a free play situation than in a structured activity.

In the investigation of egocentric speech, subjects of 4 and 6 years did not differ significantly from the 8 and 10 year olds in the percentage of egocentric speech. Sixty-one of the 64 subjects obtained percentage scores of .25 or less.

As summarized in Table 32, the analysis of the data on the correlations between the verbal profiles for a dyad indicated the following.

1. At the level of structured activity, the relationship between female profiles was significantly more positive than the relationship between male profiles.

2. The relationship for 8 and 10 year olds was significantly more positive than the relationship for 4 and 6 year olds.

As summarized in Table 33, an analysis of the nonverbal frequencies showed that:

1. At the level of structured activity, 4 year old females emitted significantly fewer nonverbal behaviors than 4 year old, 8 year old, and 10 year old males as well as 8 year old and 10 year old females. Six year old females and 6 year old males presented significantly fewer nonverbal behaviors than the 10 year old and 8 year old females did, while 10 year old males emitted significantly fewer nonverbal

TABLE 32

A SUMMARY OF THE

SIGNIFICANT VERBAL RELATIONSHIPS

Structured Activity	
	M < F
Age	
	4 + 6 < 8 + 10

Notes. M = Males.

F = Females.

4, 6, 8, 10 = years.

TABLE 33

A SUMMARY OF THE

SIGNIFICANT NONVERBAL EFFECTS

Structured Activity

4F < 4M, 8M, 10M, 8F, 10F

6F < 10F, 8F

6M < 10F, 8F

10M < 8F

4 + 6 < 8 + 10 (Same for free play)

Females

4SA + 6SA < 4FP, 6FP, 8FP, 10FP, 8SA, 10SA

4 + 6 < 8 + 10

4 Year Olds

F.SA < M.SA, M.FP, F.FP

F < M

FP < SA

6 Year Olds

SA < FP

8 Year Olds

SA < FP

M.SA < M.FP, F.SA, F.FP

10 Year Olds

SA < FP

M.SA < M.FP, F.SA, F.FP

Age

4 + 6 < 8 + 10

Notes. SA = Structured activity.

FP = Free play situation.

F = Females.

M = Males.

4, 6, 8, 10 = Years.

behaviors than the 8 year old females did.

When compared to 8 and 10 year olds, 4 and 6 year olds emitted significantly fewer nonverbal behaviors. (This latter result is the same for the free play situation.)

2. For females, 4 and 6 year olds in a structured situation emitted significantly fewer nonverbal behaviors than all other age by situation groups did. In addition, 4 and 6 year olds presented significantly fewer nonverbal behaviors than 8 and 10 year olds emitted.

3. For 4 year olds, females in a structured situation displayed significantly fewer nonverbal behaviors than males in a free play situation, males in a structured activity, and females in a free play situation. As well, females at this age level presented significantly fewer nonverbal behaviors than males. For 4 years, significantly more nonverbal behaviors were emitted while in a free play situation than while in a structured situation.

4. At 6 years, more behaviors were emitted in a free play situation than in a structured activity.

5. For 8 year olds, males in a structured activity displayed significantly fewer nonverbal behaviors than all other sex by situation groups did. At this age level more nonverbal behaviors were emitted in the free play situation than

in a structured activity.

6. For 10 year olds, the results were the same as for 8 year olds.

7. Four and 6 year olds emitted significantly fewer nonverbal behaviors than 8 and 10 year olds emitted.

As summarized in Table 34, the analysis of the data on the relationship between nonverbal profiles showed the following:

1. The relationship between nonverbal profiles was significantly more positive in a free play situation than a structured activity situation.

2. The relationship between the nonverbal profiles was significantly more positive for 8 and 10 year olds than 4 and 6 year olds.

3. For males, the relationship for 4, 6, and 8 year olds was significantly less positive than for 10 year olds.

4. For males, the nonverbal relationship was significantly more positive in a structured activity than a free play activity.

5. For the structured activity the relationship for females was more positive than the relationship for males.

6. For 10 year olds, the relationship for males was significantly more positive than the relationship for females.

TABLE 34

A SUMMARY OF THE

SIGNIFICANT NONVERBAL RELATIONSHIPS

Structured Activity	
	M < F
Males	
	4 + 6 + 8 < 10
Females	
	FP < SA
10 Years	
	FP < SA
Age	
	4 + 6 < 8 + 10
Situation	
	SA < FP

Notes. FP = Free play.

SA = Structured activity.

M = Males.

F = Females.

4, 6, 8, 10 = Years.

As summarized in Table 35, the analysis of the data using verbal plus nonverbal frequencies suggested that:

1. For males, 4 and 6 year olds in a structured activity emitted significantly fewer nonverbal behaviors than 4, 6, 8, and 10 year olds in a free play situation. Ten year olds in a structured situation emitted significantly fewer nonverbal behaviors than 6, 8, and 10 year olds in a free play situation while 8 year olds in a structured activity situation emitted significantly fewer behaviors than 10 year olds in a free play situation. The total number of behaviors emitted in a free play situation was significantly greater than the total number of behaviors emitted in the structured activity.

2. For females, 4 and 6 year-olds in a structured situation emitted significantly fewer behaviors than all other groups.

3. For the structured activity, 8 year old females emitted significantly more behaviors than 4, 6, and 10 year old males and 4 and 6 year old females. Four year old females presented significantly less than 8 and 10 year old males and females; while 6 year old females emitted significantly less behaviors than 8 year old males and 8 and 10 year old females.

TABLE 35

A SUMMARY OF THE SIGNIFICANT

VERBAL PLUS NONVERBAL EFFECTS

Structured Activity	
4F	< 8M, 10M, 8F, 10F
6F	< 8M, 8F, 10F
4M, 6M, 10M, 4F, 6F	< 8F
Males	
4SA	< 4FP, 6FP, 8FP, 10FP
6SA	< 4FP, 6FP, 8FP, 10FP
10SA	< 4FP, 6FP, 8FP, 10FP
8SA	< 10FP
Females	
4SA + 6SA	< 8SA, 10SA, 4FP, 6FP, 8FP, 10FP
Age	
4 + 6	< 8 + 10

Notes. FP = Free play.

SA = Structured activity.

M = Males.

F = Females.

4, 6, 8, 10 = Years.

4. Eight year olds and 10 year olds emitted significantly more behaviors than 4 and 6 year olds.

In light of the results, the effects of age, sex, and situation on the verbal behaviors, nonverbal behaviors, and verbal plus nonverbal behaviors was generally an interaction. It was not a simple main effect as postulated in the hypotheses.

CHAPTER VI

DISCUSSION

Hypotheses

The data obtained did not support any of the nine hypotheses. It was hypothesized that age, sex, and/or situation affected the verbal and nonverbal behaviors of children; however, results indicated that it was an interaction among the variables that affected behavior rather than simply an effect of a single variable.

In hypothesis 1 it was suggested that the age of a subject and his situation influenced his verbal behavior, while his sex did not. Contrary to this expectation, it was an interaction between age and situation that influenced verbal behavior. The variable sex, however, remained nonsignificant. This latter result was consistent with the literature (Cohen & Klein, 1968; Fisher, 1934; Mueller, 1972; Tierney & Rubin, 1972). However, the former result was not. As noted in Chapter II, investigators have reported that socialized speech has been influenced by age (Cohen & Klein, 1968; Day, 1932; Flavell et al., 1968; Fishbein, Lewis, & Keiffer, 1972; Fisher, 1934; Longhurst & Tierniere, 1971; McCarthy, 1930; Piaget, 1974; Rubin, 1973; Tierney & Rubin, 1975), or situation (Kamp & Kessler, 1970; Williams & Mattson, 1942).

Unlike this study, these investigators were interested only in the effects of one of the variables on a child's verbal behaviors. Thus, it was not possible to determine if the interaction of the variables of age, sex, and situation influenced a child's verbal behaviors of if verbal behavior was affected by single variables as indicated in the results of these studies.

In hypotheses 2 and 3 it was suggested that the proportion of egocentric speech in the conversations of 4 and 6 year olds would be 40% or greater, while the proportion of egocentric speech in the conversation of 8 and 10 year olds would be 25% or less. Results indicated that, out of 64 subjects, only one 4 year old had a percentage of egocentric speech of 40% or greater; whereas seven 4 year olds, six 6 year olds, eight 8 year olds, and eight 10 year olds had a percentage of 25 or less. These results are consistant with the literature (Day, 1932; Fisher, 1934; Garvey & Hogan, 1973; Piaget, 1974; Rugg, Kruger & Sondergaard, 1929) which suggested an increase in egocentric speech with age. It is suggested that the discrepancy between the present results and the literature could be because all subjects attended a day care center, a gym class, or school on a regular basis. This meant that each child had made contact with his peers,

had been confronted with different points of view, and had been forced to reexamine his own perspectives. Piaget (1974) has implied that such social experiences encourage the development of socialized speech.

In hypothesis 4 it was predicted that for a given category on the Bales' IPA (see Table 1, p. 35), the verbal measures for children whose proportion of egocentric speech was 40% or greater would differ significantly from the verbal measures for children whose proportion of egocentric speech was 25% or less. In this study, 61 of the 64 subjects scored in the egocentric category of 25% or less. As a result, this hypothesis was not testable.

Due to the findings on role-taking ability, hypothesis 5 predicted that the relationshp between the verbal profiles for a dyad would be influenced only by the age of the subjects. Contrary to expectations, the results showed a significant sex by situation interaction effect as well as a significant age effect. Research on role-taking has tended to support an age effect (Cohen & Klein, 1958; Devries, 1970; Flavell et al., 1968; Marvin et al., 1976; Menig-Peterson, 1975; Miller et al., 1970; Salatas & Flavell, 1976). This finding was reconfirmed in the present study. However, prior researchers reported that neither the sex of the child nor

the situation influenced role-taking ability except possibly at a preschool level (Klauss & Glucksberg, 1968; Peterson et al., 1972). This was not the case in the present investigation. Rather, results suggested that the interaction between sex and situation was not influenced by age level but rather by the situation. In a structured activity, females adapted their verbal behavior to meet the verbal needs of their partners more often that did the males.

In hypothesis 6 the investigator postulated that the nonverbal behaviors of same-sex dyads would be influenced by the situation but not by the sex or age of a subject. The data indicated a significant age by sex by situation interaction effect, significant age by situation effect, a significant age by sex effect, a main age effect, and a main situation effect. In the literature on nonverbal behaviors, an age by sex interaction effect has been reported by Aiello and Aiello (1974), Bass and Weinstein (1971), and Post and Hetherington (1974). A main age effect has been reported by Ashear and Snortum (1977), Hamilton (1973), Levine and Sutton-Smith (1972), Lord (1974), and Odom and Lemond (1972) and a main situation effect has been reported by Bass and Weinstein (1971) and Guardo (1969). In this study all of variables were found to be significant. The significant

triple interaction effect has not been supported in the literature; however, investigators have interested themselves with the interaction of only two of the variables and have excluded the third. It should be noted, however, that both the literature and the results of this study appeared to encourage the view that the various nonverbal behaviors are influenced differently; although age, sex, and situation appeared to influence nonverbal behaviors as a whole, many of the individual behaviors were influenced differently by the three variables.

In hypothesis 7 it was predicted that the nonverbal proportions for Bales' categories 4 to 9 would be significantly greater in the structured activity than in the free play situation. The data partially supported the hypothesis. For categories 4 to 8, more nonverbal behaviors were emitted by children in the structured activity situation than in the free play situation. However, contrary to the expectations, data indicated a significant difference between situations for categories 1, 2, 10, 11, and 12 in addition to those hypothesized but did not find the expected difference for category 9. On closer observation, the proportions of nonverbal behaviors for 10 and 11 were significantly greater in the structured activity, while the proportions for 1, 2,

and 12 were significantly greater in the free play situation. This implied that, while the structured activity encouraged nonverbal task oriented behaviors, it discouraged very positive or very negative nonverbal behaviors. Subjects were freer to express very positive or very negative nonverbal behavior in the free play situation than in the structured activity situation. It was also of interest to note that subjects emitted more tension behaviors (category 11) in the structured activity than in the free play situation. This difference between situations suggested that subjects were under stress due to the task demands of co-operation and organization while in the structured activity. These demands were not present in the free play situation.

In hypothesis 8 it was proposed that the relationship between the nonverbal profiles for a dyad would not be influenced by age, sex, or situation. However, the data did not support this hypothesis. The results indicated significant sex by situation and age by sex interaction effects. On closer observation, the sex by situation interaction effect was significant only for females, while the age by sex interaction effect was significant only for males. The present writer was unable to find previous studies that addressed themselves to the combined effects of age, sex,

and situation on the relationship between the nonverbal profiles for a dyad. Thus it was not possible to find either support or contradictory evidence for the findings of this study in the literature.

Hypothesis 9 predicted that when the verbal and nonverbal behaviors were combined, age, sex, and situation would not influence the behaviors. Contrary to the expectations, an age by sex by situation interaction effect, a sex by situation interaction effect, a sex by situation interaction effect, and an age by situation interaction effect were significant. These results were similar to the results for verbal and nonverbal behaviors. In the literature it has been implied that there is an interrelationship between the verbal and nonverbal behaviors emitted by a speaker (Barnland, 1968; Brooks & Emmert, 1976; Clausen, 1968; Inkles, 1968). However, nonverbal and verbal behaviors have been investigated independently of each other. Since the results of the verbal plus nonverbal behaviors were similar to the results for the verbal and for the nonverbal behaviors, it was suggested that the investigations of either verbal or nonverbal behaviors leads to a better understanding about a child's communication behaviors in general.

Although the results did not support the nine hypotheses,

they did indicate that age, sex, and situation influenced the frequencies of both verbal and nonverbal behaviors and the relationship between the profiles.

Age

The age of a child appeared to influence the social interaction between the child and his peers. Generally, with an increase in age there was an increase in the frequency of communication behaviors and an increase in the positive relationship between a child's communication behaviors and that of his peers. However, the increase in the frequency of communication behaviors and the increase in the positive relationship between a child's communication behaviors and that of his peers were not the same for all behaviors. Between age and the frequency of verbal behavior there appeared to be a curvilinear relationship (see Figure 1). There was a steady increase in the amount of verbal behavior in a child's conversation between 4 and 8 years and then a levelling off by 10 years. Unlike verbal behavior, the increase in the amount of nonverbal behaviors in a child's social interaction did not appear to begin until 6 years of age; the increase was rapid between 6 and 8 years, and between 8 and 10 years there was a decrease (see Figure 2). Such results implied that social interaction encouraged the

FIGURE 1

MAIN AGE EFFECT

ON VERBAL BEHAVIORS

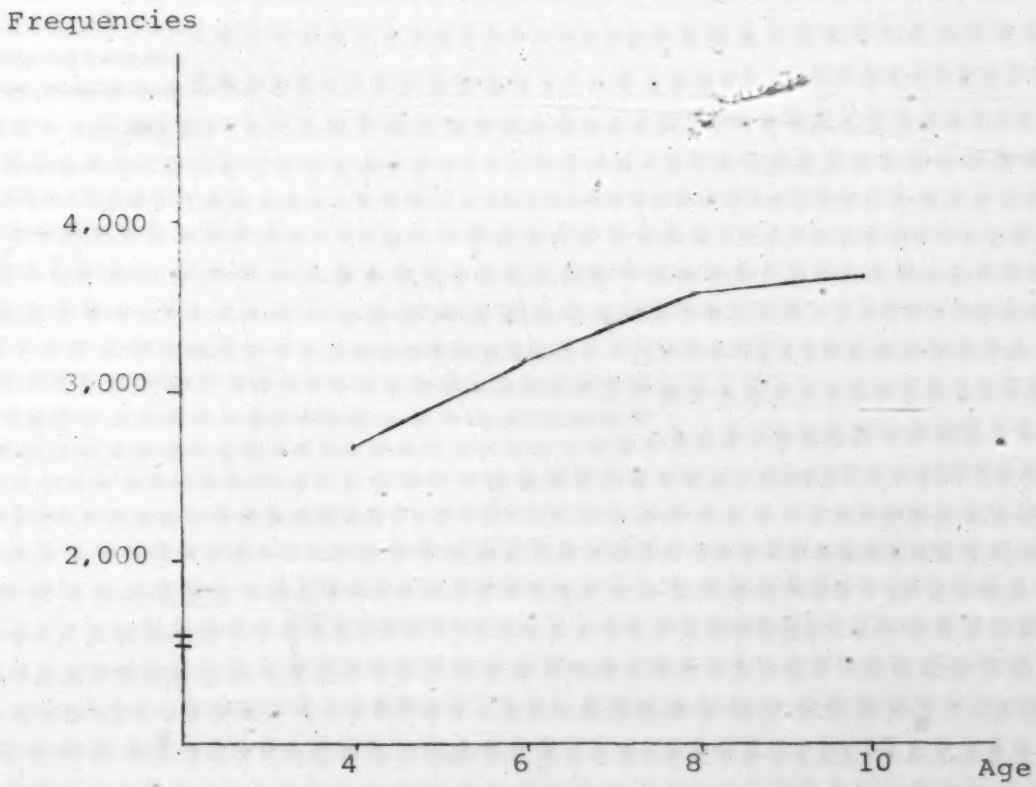
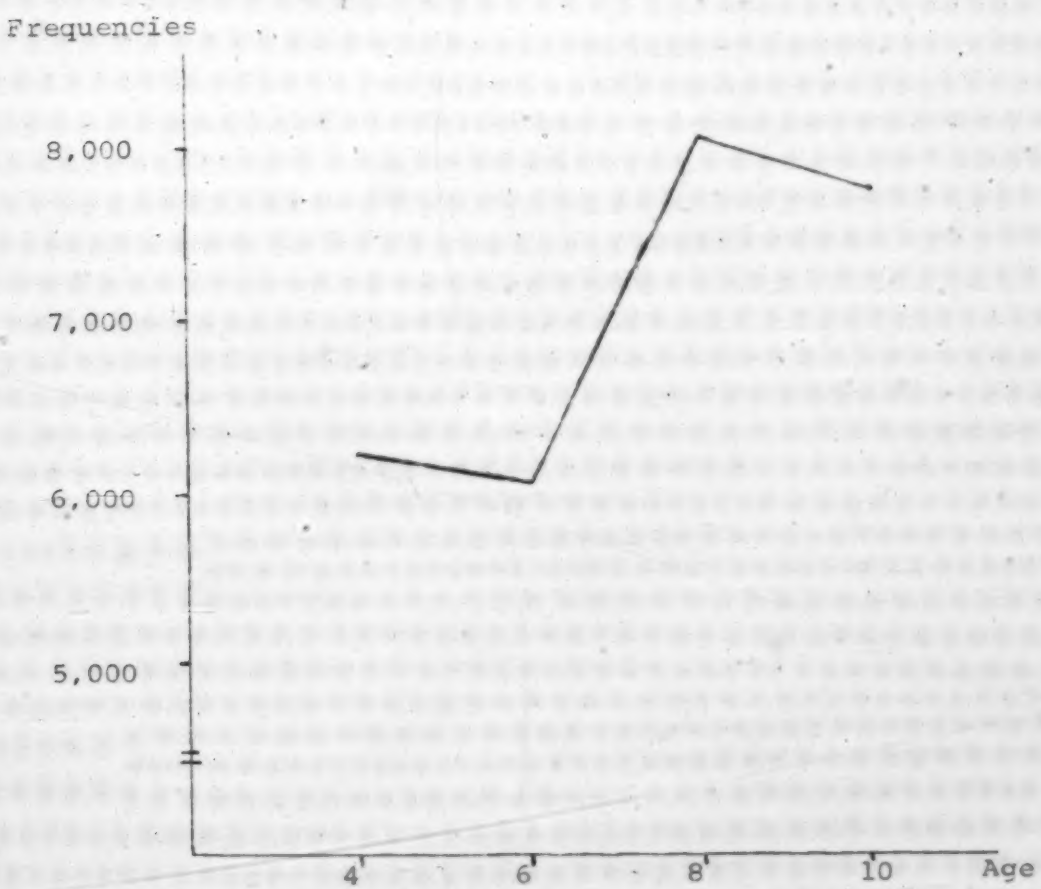


FIGURE 2

MAIN AGE EFFECT

ON NONVERBAL BEHAVIORS.



development of verbal and nonverbal behaviors in children of 4 to 8 years; however, by 10 years, only the high frequency of verbal behavior was maintained in a child's conversation.

The relationship between the verbal profiles and between the nonverbal profiles was influenced by age. Older children appeared to adapt their verbal and nonverbal behaviors to meet the social needs of their partners more than did younger children.

Age did not appear to influence the amount of egocentric behavior in a child's conversation.

Sex

The sex of a child did not appear to influence the frequency of verbal behaviors in a child's conversation but it did influence the frequency of nonverbal behaviors and the relationship between verbal profiles and between nonverbal profiles. Unlike the variable age, the influence of sex did not appear to be a main effect but rather an interaction effect. The increase in the amount of nonverbal behaviors with an increase in age appeared to be greater for females in a structured activity than for males in a structured activity. In an unstructured activity or in a free play situation, no sex differences were apparent. When considering the relationship between profiles, the sex differences

appeared to occur again only in the structured activity. In this case males appeared to adapt their social behaviors to meet the needs of their partners less than did females. Again, no sex differences were apparent in the free play situation.

Situation

The influence of the social environment on the frequency of communication behaviors and on the relationship between communication behaviors appeared to be consistent for both sex groups and all age groups. In all cases, the free play situation encouraged more communication behaviors and more adaptive behavior in children than did the structured activity. Such results implied that manipulation of the social environment could control the frequency and adaptiveness of the social communication and possibly could influence the development of social interaction between children.

Future Research

The data obtained in this study suggested that age, sex, and situation influenced the frequency of verbal and nonverbal behavior in the social interaction of children and the relationship between verbal and nonverbal profiles. This study indicated that the effects of these variables on the

behaviors are complex. Future research is recommended to determine the interaction trends. However, the design used in this study is not considered to be appropriate because of the difficulty in interpreting the triple interaction effect. For future studies the approach that is suggested is one in which two of the variables are represented by 2 or more levels, while the level of the third is experimentally controlled.

Much of the literature on communication implied that verbal and nonverbal behaviors emitted by a speaker are interrelated (Barnlund, 1968; Brooks & Emmert, 1976; Clausen, 1968; Inkeles, 1968). Many of the researchers who have investigated the social interaction between children appeared to have regarded nonverbal and verbal behaviors as independent behaviors and have studied them separately. Although the results of this study showed similarities between nonverbal data and the verbal plus nonverbal data, it was difficult to determine if an independent or dependent relationship existed between these behaviors. Future research is recommended to investigate this relationship.

The results suggested that categories of Bales' Interaction Process Analysis were sensitive to changes in

situations. It is recommended that future research be conducted to examine the effect of age or sex on the category frequencies. This could be one way of determining the different effects on the variety of nonverbal behaviors and/or verbal behaviors.

Summary

Generally, the results implied:

1. that age had a positively increasing effect on the frequency and relationships of the behaviors that were investigated in this study;

2. that sex by age interaction appeared to have greater effects on the nonverbal and verbal plus nonverbal behaviors of females;

3. that sex by situation interaction effect had a greater influence on the nonverbal and verbal plus nonverbal behaviors of males;

4. that the sex of a subject did not appear to influence his verbal behaviors;

5. that free play situation encouraged more verbal and nonverbal behaviors and a more positive relationship between verbal and nonverbal behaviors than the structured activity situation did;

6. that the situation difference was consistent for all ages;

7. that situation influenced the proportion of nonverbal behaviors scored in each category of Bales' IPA except for 3 and 7.

8. that the proportions of egocentric speech in the conversation of children of 4, 6, 8, and 10 years were similar, and

9. that the effect of age, sex, and situation on the relationship and frequency of investigated behaviors included interaction effects as well as over-all main effects.

In summary, the results suggested that age, sex, and situation influenced the frequency of the nonverbal, verbal, and nonverbal plus verbal behaviors and the relationship between the verbal and nonverbal profiles as measured by the Bales' IPA. An analysis of the frequency scores for verbal behavior indicated a significant main effect and a significant interaction effect. The nonverbal scores showed a significant age by sex by situation interaction effect, a significant situation by age interaction effect, a significant age by sex interaction effect, a significant main age and a main situation effect. The verbal plus nonverbal scores indicated a significant age by situation interaction

effect and an age by situation interaction effect. The investigation of the relationship between partner's profiles suggested that a sex by situation interaction effect and an overall main effect for age were significant for the verbal profiles. A sex by situation interaction effect and an age by sex interaction effect were significant for nonverbal profiles. An examination of the proportions of nonverbal behaviors at the level of Bales' categories suggested that situation factors influenced all categories except for 3 and 9. The results on egocentric speech suggested that there is no relationship between age and egocentric speech.

Although the significant overall main effects and some of the two variable interaction effects have been supported by the literature, researchers have not investigated the effect that the three variables have on the verbal and nonverbal behaviors of children. It was suggested that further research was needed to determine the interaction trends. It was recommended, however, that in doing further research, the approach to be followed is one in which the interaction effects of two variables are investigated while keeping the level of the third variable controlled. It was believed that this would be more appropriate and would give a better insight into any significant relationships that do exist.

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APPENDIX A

LIST OF ARTICLES IN THE "FREE PLAY" ROOM

LIST OF ARTICLES IN THE "FREE PLAY" ROOM

The articles present in the "free play" room were as follows:

Furniture

2 small tables (child size)
1 small school desk
4 small chairs
1 sand box
1 climbing frame over sand box
1 long counter with sink
1 small metal cupboard
1 large table
several plywood sheets
2 low wooden benches
1 cupboard for hanging coats

Toys

sand box with a variety of small toys
1 black board and chalk
toy dishes
doll house
1 doll carriage
2 dolls
1 stuffed dog
1 punching bag
1 bowling set
1 skipping rope
1 telephone
1 doll bed
1 gun
set of wooden building blocks
bean bags
box of small beads and string
several balls of varying sizes
several trucks of varying sizes
books
paper--white and colored
paint and paint brushes
crayons
cards and clay

Toys (continued)

4 wooden U-framed chairs
a set of 2" blocks
tinker toys

Games

checkers
Chinese checkers
snakes and ladders
hockey set
dominoes
Donald Duck's birthday party game
a ski game

APPENDIX B

INSTRUCTIONS USED IN THE

FREE PLAY AND STRUCTURED ACTIVITY SITUATIONS

INSTRUCTIONS USED IN THE FREE PLAY AND STRUCTURED ACTIVITY SITUATIONS

The following instructions were given to all dyads as an introduction to the "free play" situation.

(Directions given once inside play room)

This is the play room. I am going to leave you here together. While I am gone, you can play with any of the games and toys. If you need anything before I come back, knock on this door (indicate) and I will come back, O.K. (leave and close door).

In the structured activity, 4 and 6 year old dyads received the following instructions.

Janie Squirrel lives in a house (present model) with a door, a window, a bed, and a table (point to appropriate places). It is such a nice house that Timmy Squirrel wants a house that is just like Janie's house. He wants his house to have a bed, a table, a door, and a window (point to appropriate places) just like Janie Squirrel's house. Timmy wants his house to look just like Janie's house.

I want you to make a house for Timmy. I want it to look like Janie's house. I want it to have a door, a window, a table, and a bed. That would make Timmy Squirrel very happy.

I will put Janie's house here so that you can look at it when you need to. Remember, I want you to make one (emphasize) house for Timmy. I want Timmy's house to look just like Janie's house (pause). Now what are you to do? (If a child answers correctly say), "Right." I want you and (name of other child) to make Timmy's house together. I want Timmy's house to look just like Janie's house. Here are the blocks that you need to make one house for Timmy (point to box of blocks on table).

(If a child answers incorrectly, explain procedure in other words. Once they have answered correctly repeat question and continue as above. If the children require more than three attempts at explaining what they are to do and still answer incorrectly when questioned say) I want you and (name of other child) to make Timmy a house together. I want Timmy's house to look just like Janie's house. Here are the blocks that you need to make one house for Timmy (point to box of blocks on table).

I am going to leave you to make Timmy's house. If you finish or need anything before I return knock on that door and I will come. O.K.?

In the structured activity, 8 and 10 year old dyads received the following instructions.

This is a figure built out of blocks (place figure on table in front of subjects). Here are some blocks (point to box of Leggo blocks). I want you to build together one figure out of these blocks. I want your figure to look just like the figure that I made. (pause) Now what are you to do?

(If a child answers correctly, say) Right, I want you and (name of other child) to build one figure together. I want your figure to look just like my figure.

(If a child answers incorrectly, explain procedure in other words. Once one of them has answered correctly repeat question and continue as above. If the children require more than three attempts at explaining what they are to do and are still unable to answer the question correctly say) I want you and (name of other child) to build one figure together. I want your figure to look just like my figure.

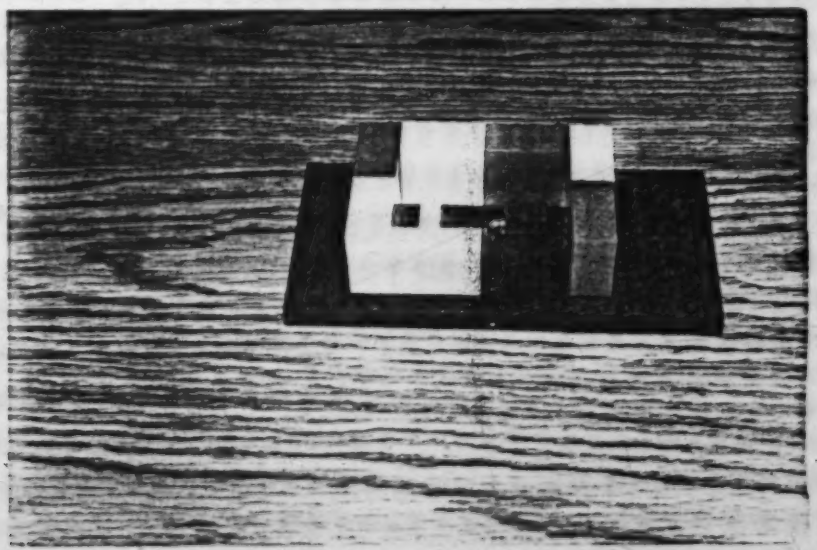
I am going to leave you to build your figure. If you finish or need anything before I return knock on that door (point to door) and I will come. O.K.?

APPENDIX C

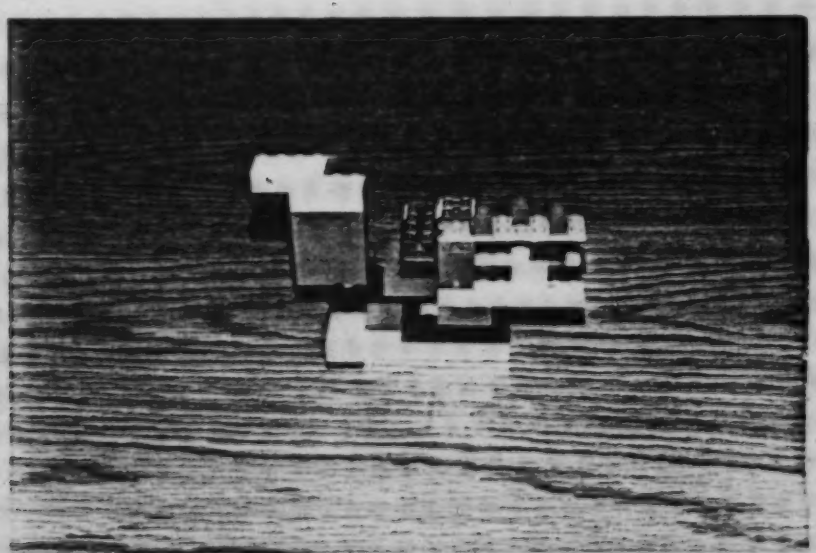
PICTURES OF MODEL USED IN THE STRUCTURED ACTIVITY

PICTURES OF MODELS USED IN THE STRUCTURED ACTIVITY

A picture of the model used in the structured activity situation for 4 and 6 year old dyads.



A picture of the model used in the structured activity situation for 8 and 10 year old dyads.



APPENDIX D

TRANSCRIPT OF THE BALES' INTERACTION PROCESS ANALYSIS *

* The raters were given this transcript to use when coding the tapes.

TRANSCRIPT OF BALES' INTERACTION PROCESS ANALYSIS

When scoring the tapes, the following rules should be kept in mind:

1. Verbal behaviors refer to spoken language behaviors such as spoken words, phrases, and sentences as well as fluencies in speech vocal tones and other voice qualities.

2. Nonverbal behaviors include bodily actions such as facial expressions, eye movements, gestures, body postures, and tactile contact as well as yawns, laughter, and sound effects while at play.

3. Egocentric speech is a form of speech which, whether uttered in solitude or in the presence of others is judged to lack a communication aim. The speaker does not attempt to take the role of the listener nor to make certain that the listener is attending (Flavell, 1974; Flavell et al., 1968; Piaget, 1974). Egocentric speech can be divided into three subcategories: (a) echolia (repeats words or syllables for the pleasure of talking), (b) monologue (talks to himself as though he were thinking aloud), and (c) dual or collective monologue (conversations between children where and outsider is always associated with the action or thought of the moment and is expected neither to attend nor to understand.

4. Verbal and nonverbal behaviors are scored separately.

5. During the analysis of verbal behaviors, egocentric speech behaviors are indicated by the use of a unique symbol, i.e. L.

6. Egocentric speech behaviors are scored in the appropriate category of the Bales' System.

7. When the experimenter is present in the taped sequence, do not score the children's behaviors.

8. Bales' General Rule on Priorities.

A. Do not score in 5 if you can reasonably score anywhere else.

B. Most important thing to record is tension--2 and 11.

C. Next most important--affective categories--1 and 12.

D. Third dimension--4 and 9.

TRANSCRIPT OF THE BALES INTERACTION PROCESS ANALYSIS

Category 1--Seems Friendly

1. Hailing, waving, drawing near to speak, saying hello, approaching, touching, treating to drink.

2. First use of Christian name or nickname. First use of we.

3. Smiling, beaming, even laughing--in sheer pleasure at other's company or with goodwill.

4. Acts of sharing, distributing.

5. Attempts to make sure the other is supplied with what he needs.

6. Praise, boosting, encouragement.

7. Acts intended to be tactful, diplomatic, discreet, allay opposition, etc.

8. Acts urging unity, harmony, co-operation, i.e. acts to continue present activity.

9. Acts or expressions which give credit to other, show enthusiasm for his view or suggestions.

10. Allowing self to be talked down--giving in to others' suggestions (i.e. activity) without rebuttal or complaint.
--the child is submissive but in a positive way.

11. Any indication of trusting, admiring, respecting, entrusting self to the other. i.e. imitating friend's behavior outside the context of an imitation game.

12. Acts which comply with group norms. i.e. comply with requests or suggestions.

Category 2--Jokes, Gives Fantasy

1. Interpret jokes broadly--any communication understood in more than one sense--or referring to emotions, tensions, deviant tendencies repressed by group norms.
   Include stories, anecdotes, gossip meant to entertain, to deal playfully and at length with a theme.
   Include fantasy, play-acting and free exercise of the creative faculties.
   Include bantering remarks.

2. Expressions of feeling better after a period of tension plus cheerfulness, buoyancy, contentment, enjoyment, delight, zest, pleasure, happiness, etc.--score here if a release of tension for others. (Where element of friendliness is appreciable--as more likely in UPB--score in category 1. Where irony or aggression is marked--as in UNB--score as 12.)

3. Much that might be scored as 6--especially if the story is about the teller--is scored as 2, provided observer feels the "as if" mood of the teller or the intent to entertain or loaded significance of words.

4. Play by play description of what subject is doing is scored in this category. (This description is generally scored as egocentric.) i.e. I'll get a spoon. I'll make some soup.

5. Sound effects to supplement play in general scored here.

6. Group fantasy play: When subjects are co-operating at play, play activities are scored in category 2.

7. Giggling and laughter to entertain.

8. Singing--watch for egocentrism.

9. Sound effects to entertain scored here.

10. Visual scanning of a toy or game to determine how it works.

11. Wandering around the room may be categorized as 2 if it suggests creativity or may be categorized as 11 if

it suggests restlessness or tension.

12. Checking blackboard drawings.
    2 if suggests creativity.
    11 if suggests tension.

13. Erasing blackboard drawings.
    2 if suggests creativity.
    11 if suggests tension.

Category 3--Agrees

1. Minor forms include giving sign of recognition as other gets ready to speak, showing interest, receptiveness, such as looking at speaker, sitting erect.

2. Include--nodding head and "I see," "Yes," "Mm," "Yah."

Category 4--Gives Suggestions

1. Suggestions as what to do.

2. Includes "taking the lead."

3. Includes acts to control communication, i.e. mentioning that a new activity is required, drawing attention to what one is doing or to do, point out relevance of what one is saying or doing.

4. Watch for trivial signs as "ah . . . oh . . . well . . . yet . . . "

5. Include suggestions as to what is expected of a subject in immediate future or under certain conditions.

6. If negative or friendly emotion included push up to 1 or down to 12.

7. Acts which might normally go under 5 or 6 may belong under 4 when implication creeps in that they are expected to control. i.e. Forcefully stated opinions (unless containing negative elements--then 12).

8. Neutral, routine requests as, "Would you give me the spoon?"

9. Signals that are meant to control attention to communication include even such apparently trivial sounds as "Ah--uh--uh"--these often aim to control, rather than indicate tension.

10. "Don't you think so?", etc.

11. In block activity choosing a block from the box or pointing to a block that is to be placed next is scored here.

12. Suggesting rules for game if presented in neutral way (if negative or friendly emotion included push up to 1 or down to 12).

13. Score task acts as searching for block in box or scanning model, etc., in this category (if neutral in tone).

Category 5--Gives Opinion

1. Including statements of moral values, intention, guiding principles, etc. provided neutral in feeling.

2. Include introspection, reasoning, reckoning, thinking, musing, cogitating. Expressions of understanding or insight. Any inductive or deductive process.

3. Further argument or statements in support of a disagreement score as 12 (not 5). Similarly, additional argument or statement in support of an agreement may be 1.

4. Places block on board may be scored as 5 if not controlling; otherwise 4.

Category 6--Gives Information

1. Basically--neutral, factual.

2. Includes repeating, restating, enlarging, clarifying (if not too large an element of new "Opinion" material) --even though original statement classified elsewhere.

3. Includes report--without inference or emotion--of some thought, feeling, action, experience of speaker's own.

4. Reporting what another has said, in neutral tone.

5. Counting.

6. Reporting game scores if in a neutral tone.

Category 7--Asks for Information

1. Questions to which the answer is a fact.

2. Asking for a check, i.e. Is it red?

3. Any routine request for repetition, i.e. "What did you say?"

Category 8--Asks for Opinion

1. Includes attempts to encourage a statement or reaction without delimiting response.

2. Includes cases where the asking is more implicit than explicit--e.g. "I can't figure out what this would really mean" etc.--unless real distress evident--then score as 11.

3. Include terminal phrases such as, "You know?" "Isn't it?"

Category 9--Asks for Suggestion

1. All neutral task-oriented acts which are submissive or turn initiative for content over to other. Feeling conveyed is concern for group norms.

2. Includes all requests (explicit or implicit) on how concrete action might proceed, i.e. "I wonder what we should do next?"

3. Acts which indicate confusion about goals or discussion.

4. Asking for suggestion to get other to clarify his objectives, i.e. "What shall we do now?"

5. Includes also acts which may not take the verbal or logical form of asking for suggestions but do in fact

do so.

6. Above only applies if no emotion. If irritated goes in 12; if friendly goes in 7.

7. If child looks to his partner to see what he is doing
   --if no emotion score as 9.
   --if emotion score as 7 or 12.
   --if repeated score as 11.

Category 10--Disagrees

1. One may disagree with another's act of agreement, or with another's act of disagreement.

2. Verbally--"No" . . . "Well" . . . "But" . . . "No way"

3. If two or three reactions made (e.g. "No, I can't accept that)--score twice.

4. One can also disagree by omission, failing to pay attention, to give a requested repetition, etc.

5. Verbal or non-verbal indications that a member is sceptical, dubious, cautious about accepting a proposal, hesitant, critical, suspicious--provided implications of ascendency or of felt hostility are absent.

6. If a person has made a suggestion, then someone disagrees with him, when first person returns to defend or restate original definition, this counts as 10.

7. Only initial act of disagreeing scores as 10--rest in 5, 6, or often 12.

8. Whenever observer sees or hears actual signs of negative feeling or emotion--score as 12.

Category 11--Laughs, Shows Tension

1. Include laughs, nervous giggles, apologetic laughs.

2. During long laughs, each new "wave" or "breath" takes a score.

3. Anxious emotionality such as hesitation, speechlessness, trembling, blenching, flushing, stammering, sweating, gulping, swallowing, wetting lips persistently.

4. Suppression, hiding, failure to mention something considered discreditable, due to conflict of values, etc.

5. More passive forms of hanging back from task demands, which do not have implication of negative social feeling. Refraining from action through fear of failure.

6. Appearing embarrassed, fussed, sheepish.

7. In laughter--watch for persons who laugh alone--or who keep on laughing longest. Laughter scores for individuals alone are more helpful than scores for group as a whole.

8. Derisive or scornful laughs go in category 12. A spontaneous, friendly grin goes in category 1.

9. Yawning (unless definite negative intention--i.e. to draw attention to boredom--then 12).

10. Trunk twisting that is not part of task demands, i.e. fidgeting in car, shaking hands, scratching.

11. Dusting sand off slacks, etc.

12. Repeated following behavior suggesting hanging back from starting or initiating an activity.

13. Looking toward door before adult returns.

14. Cleaning up after blackboard falls off frame, after sand spills on rug or after box of games spills.

15. Press block down hard on board after placement.

Category 12--Seems Negative

1. Attempts to control, direct, supervise in an arbitrary manner, where freedom of choice or consent is greatly limited or non-existent.

2. Orders such as: "Come here!"--"Get out"--"Shut up".

3. Blaming, scolding the other--reminding him of his duty. Indications that person is shocked by action of other.

4. Indications of satisfaction based on self-identification with high moral authority, i.e. appearing pompous, self-righteous, self-satisfied.

5. Attempts to over-ride other in conversation, to interrupt, or gratuitously to finish his sentence when he does not want help. Insisting on finishing--warding off interruption.

6. Any implication of inferiority or incompetence on the part of the other.

7. Ridiculing. Sarcasm. Making charges against the other. Imputing unworthy motives.

8. Acts of asserting one's claim strongly, trying to outdo the other.

9. Manifestation of aggression, annoyance, irritation.

10. Appearing to be provoked--glaring, frowning.

11. Acts showing independence of group norms and expectations, carping, harping, pestering.

12. Acts which seem disrespectful, flippant, or unrepentent when accused.

13. After an initial expression of Disagreement (scored as 10)--supporting arguments <u>may</u> be scored as 12, if observer sees or hears any actual signs of negative feeling or emotion (watch for this). e.g. "I don't think so. It seems to me we should be more careful. You have no right to go around saying things like that!"--2nd and 3rd remark definitely 12. 1st remark might be 10--but if negative emotional feeling already heard in 1st--it, too, would be scored as 12.

14. Indications that a person is detached, isolated, indifferent, disinterested, impersonal, formal, distant, reserved, forbidding in responding to the overture of another.

15. Refusal to act which frustrates, thwarts, blocks, hinders, limits the other.

16. Acts of withholding resources, denying something requested.

17. Resisting effort of another to take satisfaction from him. Stubborness, obstinacy, sulkiness.

18. Anger (or other negative emotion) held in.

19. Social timidity, shyness, tendency to appear abashed, self-conscious, to shrink from social notice.

20. Expressions of unhappiness, disappointment, resignation--if accompanied by feeling of rejection both of affection of others and of group norms.

21. Working at something other than what group is doing.

22. Slouching, day-dreaming, looking away from work or group. Leaving the room.

23. Refusing to talk loud enough to be heard.

24. Any indication that person is indisposed, apathetic, numbed, stunned.

25. Playing by self, ignoring other child (watch for egocentrism).

26. Grab toys from other child.

27. Turn back to other child when playing.

28. Group activity,--
--group activity is the last one that the pair participated in.
A--first child to leave initial act is scored as 12.
B--if both leave and do separate activities, initial

act is scored as 12.
--if both leave to start new activity together, score as 1. This new activity is the new group activity.

29. Whining remarks.

APPENDIX E

DYAD CORRELATIONS AND FISHER *Zr* SCORES

CORRELATIONS BETWEEN VERBAL

PROFILES AND FISHER Zr SCORES

Dyad		Correlation		Zr Scores	
Age	Sex	Structured Activity	Free Play	Structured Activity	Free Play
4	M	-.261	.241	- .2672	.2458
4	M	.040	.588	.0400	.6746
4	M	.243	.897	.2480	1.4566
4	M	.239	.988	.2437	2.5550
4	F	.783	.790	1.0531	1.0714
4	F	.704	.612	.8752	.7121
4	F	.791	.884	1.0741	1.3938
4	F	.115	.351	.1155	.3666
6	M	.273	.811	.2801	1.1299
6	M	.857	.551	1.2819	.6198
6	M	-.088	.302	- .0882	.3117
6	M	.770	.709	1.0203	.8852
6	F	.943	.629	1.7645	.7398
6	F	.868	.821	1.3249	1.1599
6	F	.898	.659	1.4618	.7910
6	F	.962	.660	1.9721	.7928
8	M	.602	.855	.6963	1.2745
8	M	.850	.905	1.2562	1.4992

Dyad		Correlation		Zr Scores	
Age	Sex	Structured Activity	Free Play	Structured Activity	Free Play
8	M	.761	.916	.9986	1.5636
8	M	.879	.935	1.3714	1.6967
8	F	.901	.968	1.4775	2.0595
8	F	.959	.461	1.9333	.4986
8	F	.848	.579	1.2490	.6610
8	F	.825	.878	1.1723	1.3670
10	M	.616	.971	.7185	2.1095
10	M	.944	.302	1.7736	.3117
10	M	.916	.955	1.5636	1.8857
10	M	.978	.843	2.2494	1.2315
10	F	.929	.904	1.6510	1.4937
10	F	.969	.982	2.0756	2.3507
10	F	.819	.864	1.1538	1.3089
10	F	.870	.320	1.3331	.3316

CORRELATIONS BETWEEN NONVERBAL

PROFILES AND FISHER Zr SCORES

Dyad		Correlation		Zr Score	
Age	Sex	Structured Activity	Free Play	Structured Activity	Free Play
4	M	.677	.958	.8236	1.9210
4	M	.833	.947	1.1979	1.8019
4	M	.440	.967	.4722	2.0439
4	M	.661	.995	.7946	2.9945
4	F	.787	.939	1.0635	1.7295
4	F	.933	.923	1.6811	1.6089
4	F	.863	.928	1.3050	1.6438
4	F	.794	.712	1.0903	.8912
6	M	.599	.977	.6916	2.2269
6	M	.603	.944	.6978	1.7736
6	M	.017	.952	.0170	1.8527
6	M	.891	.867	1.4268	1.3209
6	F	.925	.975	1.6226	2.1847
6	F	.994	.573	2.9031	.6520
6	F	.877	.955	1.3626	1.8857
6	F	.790	.992	1.0714	2.7587
8	M	.693	.705	.8537	.8772
8	M	.970	.882	2.0923	1.3847

Dyad		Correlation		Zr Score	
Age	Sex	Structured Activity	Free Play	Structured Activity	Free Play
8	M	.606	.964	.7026	1.9996
8	M	.705	.999	1.0849	3.8002
8	F	.986	.972	2.4774	2.1273
8	F	.997	.993	3.2504	2.8257
8	F	.650	.985	.7753	2.4427
8	F	.981	.881	2.3235	1.3802
10	M	.533	.996	.5943	3.1063
10	M	.993	.994	2.8257	2.9031
10	M	.990	.987	2.6467	2.5147
10	M	.975	.998	2.1847	3.4534
10	F	.947	.923	1.8019	1.6089
10	F	.984	.957	2.4101	1.9090
10	F	.934	.889	1.6888	1.4171
10	F	.985	.785	2.4427	1.0583